DOCUMENT RESUME

ED 178 781 CE 023 487

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|---|---|
| TITLE | Health Careers Guidebook. Fourth Edition, 1979. |
| INSTITUTION | Employment and Training Administration (DOL), Washington, D.C.; Health Resources Administration (DHEW/PHS), Bethesda, Md. |
| PUB DATE | 79 |
| NOTE | 230p.; Photographs and occasional small type appearing throughout this document will not reproduce well |
| AVAILABLE FROM | Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 029-000-00343-2) |
| EDRS PRICE | MF01/PC10 Plus Postage. |
| DESCRIPTORS | Career Opportunities; Career Planning; *Careers; Employment Qualifications; *Health Occupations; Information Sources; *Occupational Information; Salaries; Student Financial Aid; Student Loan Programs |

ABSTRACT

This guidebook provides a listing of individual health careers and descriptions. Proceeding that is a brief overview of the health field followed by suggestions and procedures for effective career planning and a section regarding the use and availability of financial aid with suggestions for application. There is also a health careers calendar which gives the number of years of required training beyond high school level for each occupation. Each career description, listed under its preferred occupational title, is divided into four basic sections: (1) alternate titles, job duties, areas of specialization in the field, (2) job requirements, (3) future employment outlook and opportunities for advancement, and (4) sources of additional information and current Dictionary of Occupational Titles code numbers. Category headings for the occupations are clinical laboratory services, dentistry, dietetics and nutrition, education, health information and communication, health services administration, medicine, nursing, pharmacy, psychology, science and engineering, social work, technical instrumentation, therapists, veterinary medicine, and vision care. A salary chart, showing starting rate range and maximum rate range for the various occupations, and a list of addresses of sources of additional information are also included along with a financial aid and student loan source list. (FP)

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# Health Careers Guidebook

ED178781

Fourth Edition, 1979

U.S. Department of Labor
Ray Marshall, Secretary

Employment and Training Administration

U.S. Department of Health, Education, and Welfare
Patricia Roberts Harris, Secretary

Health Resources Administration

CE 023 487

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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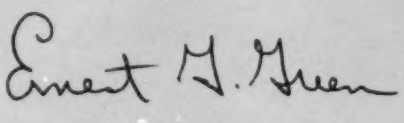
The health field is one of the largest and most important occupational areas in the American economy. The need for trained men and women in health work is an ongoing one. To service this essential area with competent and talented people, information on health occupations and career opportunities is essential. Since 1955 and through the 1965 and 1972 editions, the *Health Careers Guidebook* has been responsive to this need. It has become recognized as a standard for occupational and career information in the health field.

The 1979 edition of the *Health Careers Guidebook* continues in the tradition of its predecessors. Developed and presented cooperatively as an effort of the Department of Labor and the Department of Health, Education, and Welfare, the *Guidebook* is a document sensitive to its times. It has been enlarged to include updated occupational and technical information, including new occupations reflecting the latest developments in medical and related sciences. A revised and expanded section on financial aid for training and education in health occupations has been incorporated.

We hope this edition of the *Health Careers Guidebook* will be responsive to the needs of those seeking knowledge of health work and at the same time contribute to providing a high level of health services to all our citizens.



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Washington, D.C. 20402

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The U.S. Employment Service is deeply involved in helping to meet the critical employment needs of our country. An expression of this involvement is the development and dissemination of current and accurate occupational and career information to help individuals needing such information in choosing career goals.

The fourth edition of the *Health Careers Guidebook*, one of the U.S. Employment Service's Career Guidebook Series, has been developed with the cooperation of the Department of Health, Education, and Welfare and nationally recognized experts in the health field. As a result of these contributors and the work of the employment service's occupational specialists, the fourth edition of the *Health Careers Guidebook* provides an unusually broad and complete presentation of health career information at the national level.

We feel that the *Health Careers Guidebook* will make a significant contribution to the U.S. Employment Service's initiatives for the employment of women, youth, and members of minority groups, in addition to its usefulness to counselors, students, and others needing valid and up-to-date information on which to base career decisions or choices.

William B. Lewis

William B. Lewis
Administrator
U.S. Employment Service
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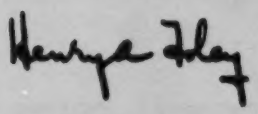
This fourth edition of the *Health Careers Guidebook* continues to serve as a valuable contribution to information widely needed and used by high school students, counselors, and personnel workers in making decisions about health careers.

This edition reflects major changes in the health field—changes in scope of occupations as well as additional ones. Each occupation is described in detail and information is given about where to get additional material so that young people can make decisions early in life about their career goals.

The cooperation between the Employment and Training Administration of the U.S. Department of Labor and the Health Resources Administration of the U.S. Department of Health, Education, and Welfare in producing this fourth edition is one indication of the importance that both agencies place on this valuable publication. The National Health Council, which has been involved in developing information about health careers for a number of years, has played a key role in developing this book. We hope that this edition of the *Health Careers Guidebook* will be as useful and as widely read as the previous editions.



Dr. Henry A. Foley
Administrator
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Education, and Welfare

## What's in the Guidebook?

- *Overview of the Health Field,* (p. 1), a quick picture of what is happening in the health field today, basic facts on the industry, where new and changing opportunities lie.
- *Career Planning* (p. 9), tips on how to explore the varied career possibilities the health field offers, how to choose a particular career, how to select the right school for training.
- *Financial Aid* (p.15), a detailed guide to finding the dollars you'll need to pay for health careers training.
- *Health Careers Calendar* (p.25), a chart that tells at a glance the time needed to train for individual health careers.
- *Individual Career Descriptions* (p. 31), arranged by 16 different areas within the health field for over 100 health occupations.
- *Reference List* (p. 205), containing the names and addresses of over 150 health organizations that provide health careers information.

## *Health Careers Guidebook,* Fourth Edition Advisory Committee

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The Department of Health, Education, and Welfare and the Department of Labor provided the photographs used in the *Health Careers Guidebook.*

# Acknowledgments

The *Health Careers Guidebook* is one of the publications in the U.S. Employment Service's career guidebook series. The series is produced under the planning and direction of Jules Spector and is compiled in the Division of Occupational Analysis, Beatrice M. O'Bryant, Chief, with general direction by the U.S. Employment Service's Office of Technical Support, Luis Sepulveda, Director.

Major responsibility for the cooperative efforts of the U.S. Department of Health, Education, and Welfare was held by Joseph Kadish, Ed.D., Chief, Division of Associated Health Professions, Bureau of Health Manpower, Health Resources Administration.

Under a grant to the National Health Council from the Employment and Training Administration, Karl M. Wolf, Director, Health Manpower Development, and Janet Zhum Masiff, consultant, worked in cooperation with the Employment and Training Administration in the preparation of the *Guidebook*. Appreciation is expressed to William Throckmorton, Office of Research and Development, for his support of the project.

Grateful appreciation is expressed to the *Health Careers Guidebook* Advisory Committee for providing broad coordination and planning as work on the fourth edition of the *Guidebook* developed.

Completion of this edition of the *Health Careers Guidebook* would have been impossible without the cooperation of the associations and agencies in the health field and related industries whose names appear in the occupational briefs and of the following individuals and organizations: J. Vic Allen, Philip Anderson, Ph.D., John Belin, Donald Buckner, Ph.D., Wayne D. Lance, Ed.D., Morton Lebow, Harold McPheeters, Ph.D., Louis A. Quatrano, Ph.D., Susan Raleigh, the American Academy of Environmental Engineers, the American Association of Electromyographic Technologists, the American Council on Pharmaceutical Education, the American Nurses Association, the American Pharmaceutical Association, the American Association of Certified Orthopedists, the Coalition of Independent Ophthalmic Professions, the Electronimicroscopy Society of America, the Hospital Financial Management Association, the National Association of Alcoholism Counselors, the National Association for Mental Health, the National Executive Housekeepers Association, the National Committee for the Prevention of Child Abuse, the National Health Lawyers Association, the National Science Foundation, and the Special Interest Group on Biomedical Computing of the Association for Computing Machinery.

Grateful acknowledgment is made to those occupational analysts in the Occupational Analysis Field Centers affiliated with the U.S. Employment Service for their contributions to the *Health Careers Guidebook:* John Doyle, Jerry Shea, and April Moss, of the California Occupational Analysis Field Center, J. Edmond Phillips, Supervisor; Don Foley, Doris Phelan, and Edna M. Neuwirth, of the Missouri Occupational Analysis Field Center, Bernard J. Teiber, Supervisor; Elaine Levy and Martin Cleere, of the New York Occupational Analysis Field Center, Lawrence Ruscher, Supervisor; Russ Heilman and Arlyin Iverson, of the Wisconsin Occupational Analysis Field Center, Eugene Marquardt, Supervisor.

Special acknowledgment is made to Elaine Levy and Martin Cleere for their technical assistance in the development of draft materials for the *Guidebook*.

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If you could travel back in time about a hundred years, you would be surprised at how primitive health care was compared with what it is today. Those were the days of horse and buggy medicine when doctors often traveled long miles on country roads to treat their patients. Most medical care, from surgery to childbirth, took place in patients' homes rather than in hospitals. In 1873, there were only 178 hospitals in the entire country. Much of the medical treatment then was educated guesswork. In making a diagnosis, doctors had to depend solely on what their patients told them and what they could observe. No X-rays, lab tests, or advanced medical technologies were available to assist them. And once the problem was determined, there were no miracle drugs with which to treat patients. Even penicillin, a drug we take much for granted today, has been in general use only since World War II.

It is not surprising that the average life expectancy in 1900 was only 47.3 years, and diseases such as tuberculosis and diphtheria (which seldom occur today) were common killers.

The health system, what there was of it, was composed almost entirely of just three types of health workers—doctors, dentists, and nurses. Since the turn of the century, health care—like the world around us—has changed dramatically.

Today people seldom receive medical care in their own homes. The horse and buggy which carried doctors to patients has been replaced by the ambulance. Modern medicine has helped to increase the average life span to 70.9 years, and sophisticated technology assists doctors in the diagnosis, treatment, and prevention of illnesses. Within a short time, physicians can have a complete chemical analysis of body tissues and fluids. Computerized X-ray techniques make it possible to view entire cross sections of the human body, and the electron microscope can reveal to scientists even the molecular structure of a person's cells.

Health care has grown into a complex system with many important links. In this chapter, we will look briefly at some of the major links which are a part of the health care system. We will also examine some of the factors which are affecting the system today. Understanding where this system is now and where it might be going should give you extremely important clues to career opportunities. The chapter will not only help you evaluate where the jobs are likely to be but also show you where a particular health career fits into the entire picture.

- Americans see physicians over a *billion* times each year.
- Americans see dentists over 333 million times each year.
- One out of every 10 Americans goes to a hospital for care at least once during each year.

## How Many People Work in the Health Industry?

- In 1977, there were 4.7 million people working in health care occupations such as doctor, nurse, technician, therapist, or technologist.
- At least another million work as health support personnel in the maintenance and clerical staff found in health facilities; thousands more are employed as manufacturers of drugs or other health supplies.
- Many believe that the health industry will be the largest employer in our country within the next 10 years.

## Who Are the Health Support Personnel?

These individuals have not been specifically trained in health, but their skills and knowledge are vital to daily operations. These professionals have chosen employment in the health field rather than in another industry. Almost any kind of worker who is found in business and other industries has a counterpart in health. Some of these workers are:

Accountant
Administrative Assistant
Bookkeeper
Cafeteria Manager
Cashier
Chaplain
Clerk (Accounts Payable and Receivable, Collection, File, General Office, Information, Insurance, Inventory, Mail, or Payroll)
Computer Operator
Controller-Business Manager
Credit Manager
Education Coordinator
Electronic Data Processing Manager
Employment Interviewer
Employment Supervisor
Executive Housekeeper
Food Production Manager
General Secretary

Job Analyst
Keypunch Operator
Laundry Manager
Management Engineer
Personnel Director
Public Relations Director
Purchasing Agent
Receptionist
Stenographer
Stock Clerk
Stockroom Manager
Switchboard Operator
Systems Analyst
Training Coordinator
Typist
Wage and Salary Administrator

## Who Are These Health Workers?

*Estimated number of people employed in selected health occupations, 1974.*

| | *Approximate Number* | *Percent of Total* |
|---|---|---|
| Nursing | 2,320,800 | 51.2 |
| Medicine [1] | 659,800 | 14.6 |
| Dentistry | 279,800 | 6.2 |
| Health Services Administration | 248,200 | 5.5 |
| Clinical Laboratory Services | 172,500 | 3.8 |
| Pharmacy | 132,900 | 2.9 |
| Technical Instrumentation | 132,500 | 2.9 |
| Therapists | 123,250 | 2.7 |
| Science and Engineering | 111,100 | 2.4 |
| Dietetics and Nutrition | 102,700 | 2.3 |
| Health Information and Communication | 80,800 | 1.8 |
| Vision Care | 59,700 | 1.3 |
| Psychology | 35,000 | .8 |
| Veterinary Medicine | 33,500 | .7 |
| Education | 23,000 | .5 |
| Chiropractic | 16,600 | .4 |
| | 4,532,150 [2] | 100.0 |

[1] Medicine includes: Physician, Podiatrist, Podiatric Assistant, Physician's Assistant, Medical Assistant, Emergency Medical Technician, and Operating Room Technician.

[2] Not included in these figures are approximately 300,000 general secretarial and office workers who work in health facilities.

SOURCE: *Health Resources Statistics*, 1975, National Center for Health Statistics, Health, Education, and Welfare

NOTE: Individual occupations are represented under the major categories listed in the table of contents of this publication.

## Where Do These People Work?

### Hospitals

Hospitals are the best known and largest single employer of health workers. In the broadest sense, hospitals can be grouped into two types—the general or short-term hospital and the specialty or long-term care facility.

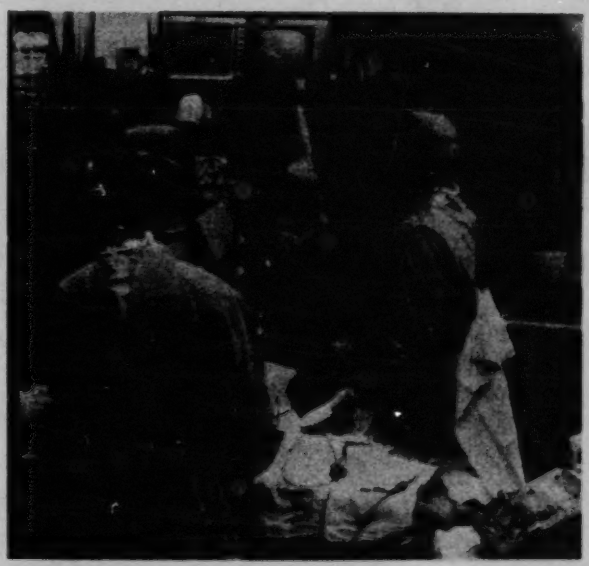
The general hospital cares for the patients with varying medical conditions which require diagnosis and surgical/medical treatment. This is the hospital you are most likely to see in your own community and to go to if you or a member of your family has a medical problem. They represent 87 percent of all hospitals. Patients in these hospitals generally stay a short time—a few days to a few weeks.

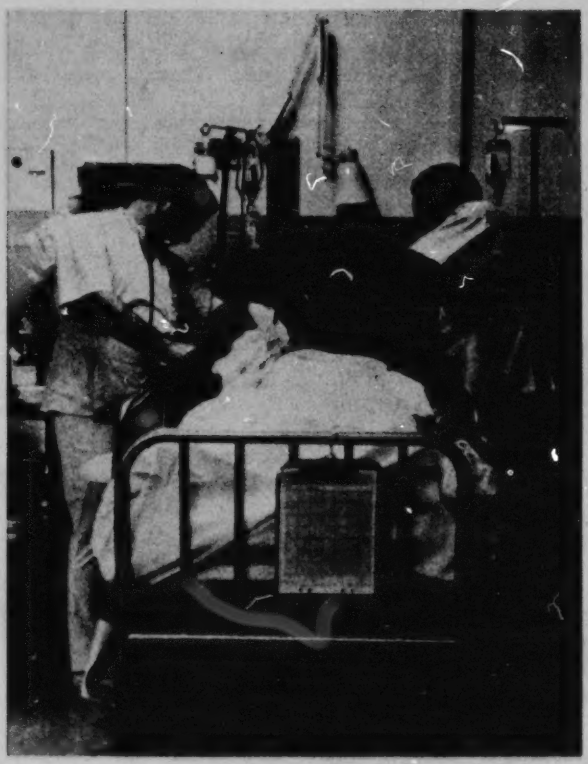
In specialty hospitals, patients are usually limited to those who have a *specific* illness or condition. Some of these hospitals are for psychiatric, chronic disease, and rehabilitation patients. Specialty hospitals are also identified generally as "long-term," since their patients are usually hospitalized for several months before they are well enough to return to their homes.

Both specialty and general hospitals may vary in size. Some may have as few as 50 hospital beds while others may have well over 1,000 beds.

Also, hospitals are identified by their ownership: Government, voluntary, and proprietary hospitals.

Government hospitals may be operated and supported by cities, States, or the Federal Government. A





city or municipal hospital, a State psychiatric institution, or a Veterans Administration hospital are examples of government institutions.

The voluntary hospitals are nonprofit institutions which are privately owned by religious or nonreligious groups.

Finally, proprietary hospitals are those which operate for profit. They are most often owned by a hospital chain corporation or a group of physicians. These hospitals are usually small and offer limited medical services.

## Nursing Homes

Nursing homes were almost unknown before the 1930's; however, since then the number of them has grown rapidly. Today we have over 22,000 nursing homes which employ over 700,000 people. Depending on the individual nursing home, the services offered may vary from skilled bedside nursing to simple personal care (bathing, dressing, providing meals, etc.). Though nursing homes are associated with the elderly, adults of any age who are victims of certain diseases or accidents may require nursing home care.

## Other Inpatient Facilities

In addition to nursing homes, there are over 5,000 other residential health facilities for persons who do not necessarily have to be hospitalized. These include residential schools or homes for the mentally retarded, emotionally disturbed, physically handicapped, the deaf, the blind, dependent children, alcoholics, and drug abusers. About half of these facilities are for the mentally retarded and emotionally disturbed and employ about three-quarters of the 250,000 workers in this type of institution.

## Outpatient and Other Health Facilities or Services

Close to half a million health workers are employed in other vital types of settings or services which are often overlooked as part of the health industry when evaluating career opportunities in the health fields.

1. *Ambulance Services*—transport patients and frequently provide emergency medical services.
2. *Blood Banks*—draw, process, store, and distribute human whole blood and its derivatives.
3. *Clinical (Medical) Laboratories*—test samples of tissues or fluids to determine the presence and extent or absence of diseases in order to help physicians diagnose or treat illness.
4. *Dental Laboratories*—provide services to dentists by making and repairing artificial teeth and other dental appliances.
5. *Family Planning Services*—provide physican examinations, laboratory tests, consultations, treatments, and issuance of drugs and contraceptives related to reproduction.
6. *Home Health Services*—provide health care and supportive services to sick or disabled persons at their place of residence when the nature of their illness does not require hospital or nursing home care or when their disabilities do not allow them to travel to an outpatient health facility.
7. *Optician Establishments*—stores or shops that sell and/or make eyeglasses according to the prescription of an optometrist or an ophthalmologist.
8. *Poison Control Centers*—provide information on the ingredients of poisons and recommend treatment. Some centers also have facilities for treating poison victims.
9. *Rehabilitation Centers*—provide comprehensive services for people with physical, mental, or social disabilities to help them return to a satisfying job

and lifestyle. Certain centers might work with special problems only—rehabilitation of the blind, the deaf, or the mentally retarded.

10. *Community Mental Health Centers*—provide inpatient/outpatient, day care, 24-hour emergency, consultation, and educational services for problems related to mental health.
11. *Migrant Health Programs*—provide health services to migrant and seasonal farmworkers who would not ordinarily qualify for health services available to permanent residents of a particular State.
12. *Neighborhood Health Centers*—provide medical, dental, laboratory, radiological, and pharmaceutical services for people living in a particular geopraphic area within a city.
13. *Health Maintenance Organizations (HMO's)*—provide consumers with comprehensive health services including hospitalization, office visits, preventive health checkups, and immunizations. Instead of the traditional pay-as-you-go system, consumers and/or their employers pay a fixed monthly fee which covers all these services no matter how often they are used.
14. *Government*—at the Federal, State and local level offers numerous opportunities for health professionals. State and local governments operate health departments which help to control the spread of communicable diseases, safeguard the purity of food and water supplies, and promote health education and health measures such as inoculations.

    In the Federal Government, the U.S. Department of Health, Education, and Welfare's Public Health Service (PHS) is specifically concerned with the health of all Americans.

    Other branches of the Government also offer opportunities for health-related employment. The U.S. Department of Labor's Occupational Safety and Health Administration enforces standards related to job health and safety. The U.S. Department of Agriculture's State-sponsored programs insure that the meat, poultry, and eggs we eat are disease free and meet sanitary conditions. The U.S. Army, Navy, and Air Force and the Veterans Administration offer employment opportunities in just about every health occupation described in this book.
15. *Health Practitioners' Offices*—employ health professionals of various kinds, depending on the size of the practice and the patients who are being served. Some practitioners work alone in private practice while others "group" together and share office space and services. This is called a group practice. Practitioners who commonly operate their own offices include medical and osteopathic physicians, dentists, chiropractors, podiatrists, optometrists, psychologists, and veterinarians.
16. *Voluntary Health Agencies*—at the national, State, and local levels are concerned with specific health problems or health services. Some of their activities include raising funds for medical research, alerting the public to specific health problems, providing health education programs, and making health services more available at a community level. The American Cancer Society, The National Foundation-March Of Dimes, The American National Red Cross, and the American Heart Association are examples of voluntary health agencies.
17. *Professional Health Associations*—at the national, State, and local levels represent the members of a particular health profession or of a particular type of health facility such as an association of hospitals or community health centers. Their activities often include improving the professional education of their members, establishing standards of practice or operations for their fields, and carrying out research of interest to their members. The American Medical Association, American Hospital Association, American Association of Medical Assistants, and the National Association of Community Health Centers are some examples.
18. *Industry*—not only manufactures prescription drugs and numerous over-the-counter medications but also produces common household health supplies as well as supplies used by hospitals and other health facilities.

    Medical devices such as hearing aids, cardiac pacemakers, artificial limbs, and braces are made by industry, as is the sophisticated diagnostic and treatment equipment used by health personnel today.

    But industry does not just produce these items; it also employs thousands of people in research and development to discover new health products and technology which will improve health care.

    Because industry employs millions of people, many of the large corporations have started health clinics manned by health professionals within their own companies. Here employees can receive immediate, on-the-spot health care as well as health checkups.

Occupational health and safety of workers is a vital concern, and industry employs special health personnel to insure that employees will not be exposed to unnecessary job hazards.

## Where Will Employment Opportunities Be?

Health care is always moving in new and different directions. These directions may alter what health workers will be doing, where they will be working, and how many will be employed in a particular occupation. Opportunities may expand in some areas and diminish in others. This has already happened in the case of many careers described in the occupational briefs included in this publication.

No one can predict with absolute certainty what the future employment outlook will be for a particular career. The following trends will give you some clues as to where you might find especially good opportunities today and in the future.

### Changing Opportunities From New Technology

Advances in technology are frequently responsible for many changes. Research is constantly conducted to discover methods of preventing disease or to improve ways of diagnosing and treating illness. This often results in the development and introduction of a complex machine or a sophisticated medical technique into health care. Of course, when this happens, health workers must be trained to operate the machine or to perform the technique correctly and safely.

The first persons selected for training are usually people who are already employed in health and work in a related area. They receive on-the-job training. However, as the new service becomes better known and is more widely used by hospitals and other health facilities, more workers are needed. On-the-job training is often no longer practical, and formal education programs in hospitals or colleges are started. Qualified students—not just health care workers—then have the opportunity for training. As the number of these newly trained workers increases, a separate and distinct new occupation may emerge.

### New Opportunities Through Expanded Functions of Some Health Workers

The work of the dental hygienist is a case in point. The daily work activities of this health professional have been expanded. That is, dental hygienists in many States now perform some tasks which were previously done by dentists alone. These increased responsibilities have resulted from a new understanding of how overall dental care can be provided. We realize now that dental hygienists, with additional careful training, can safely perform some activities performed by dentists such as giving local anesthetics. This frees dentists to carry out the more complicated procedures for which their extensive training has prepared them. It also means that the dentist, assisted by a dental hygienist, can provide dental services to more patients without sacrificing the quality of dental care.

This same concept is being used in medical care today with the physician assistant and nurse practitioner. Both of these professionals perform many of the tasks which were traditionally only done by physicians. Giving physical examinations, prescribing simple medications, and giving immunizations or patient treatments are some of the tasks they perform. Physicians can then devote their time to patients who are more seriously ill.

### Better Opportunities in Rural and Inner-City Communities

Today in some parts of the country new health workers are finding it difficult to obtain jobs, while in other places communities cannot find enough of the same people to fill existing jobs. This is a national problem often referred to as the maldistribution of health personnel. It means that health care workers are not distributed according to the population, size, and health needs of many geographic areas. Over-populated inner-city areas and underpopulated rural areas are hardest hit by this maldistribution.

In 1973, 140 rural counties were without a practicing physician. In the poverty areas of Chicago, there were 26 physicians for 100,000 residents, while in its more affluent areas there were 210 physicians for every 100,000 people. Doctors are not the only health workers who are in short supply. Shortage areas need health professionals of all kinds. All this means is that you might have to relocate to where you are most needed in order to find the best future opportunities.

## More Opportunities in Primary Care Than in Specialized Care Services

Most Americans need primary health care which focuses on prevention, early detection and treatment, and continued overall responsibility for the patient. Primary care can often reduce health costs, since it is generally easier and cheaper to prevent problems or treat them in their earliest stages. Although the number of primary care physicians is growing, physicians who practice this kind of basic medicine are still outnumbered 3 to 1 by those doctors who specialize in other fields.

Primary care services should become increasingly more available. Medical schools are encouraging students to go into primary care practice by emphasizing its importance and by exposing students to primary care earlier in their training. Primary care is now even recognized as an official medical specialty under the name of "family medicine"—comprehensive, primary health care services for all family members.

This increased emphasis on primary care affects not only the career of the physician but also of most other health workers who assist or support the physician. Where people work is also affected. Facilities which emphasize primary care, such as health maintenance organizations and neighborhood health centers, should increase in number.

## Expanding Opportunities in Outpatient Health Facilities

Just 11 years ago the United States spent $39 billion on health care. Today we spend over $139 billion. Containing these costs will be a major, if not *the* most important, priority of the health field during the coming years.

Because the cost of inpatient care in hospitals and nursing homes represents a large part of our Nation's health care bill, new efforts have been taken to keep this cost down. Outpatient alternatives to hospitals or nursing homes are being used successfully. Home care services now enable many ill or aged people to remain in their own homes rather than live as patients in nursing homes. With a growing elderly population, home care services should become increasingly more important and again more persons will be needed to deliver these services.

Ambulatory or "walk-in" patient care in private practitioners' offices, hospital outpatient departments, community health centers, or other health facilities is helping to reduce hospitalization.

In the past, many medical procedures, including certain diagnostic tests and simple surgery, were only done on an inpatient hospital basis. Now, however, these same procedures are safely and routinely performed on an outpatient basis in an office setting. This greater emphasis on ambulatory care may shift employment opportunities from hospitals to other kinds of health facilities.

## Opportunities for Women and Minorities

In recent years thousands of women and minorities have entered health professions in which they have traditionally been underrepresented. The following enrollment figures from medical schools are an example of the fact that many of them are now saying "yes, I can" to such fields:

*Women and minorities as a percent of all first-year medical students*

| | *1968–69* | *1974–75* |
|---|---|---|
| Women | 9.0 | 22.2 |
| Minorities | 4.2 | 12.5 |

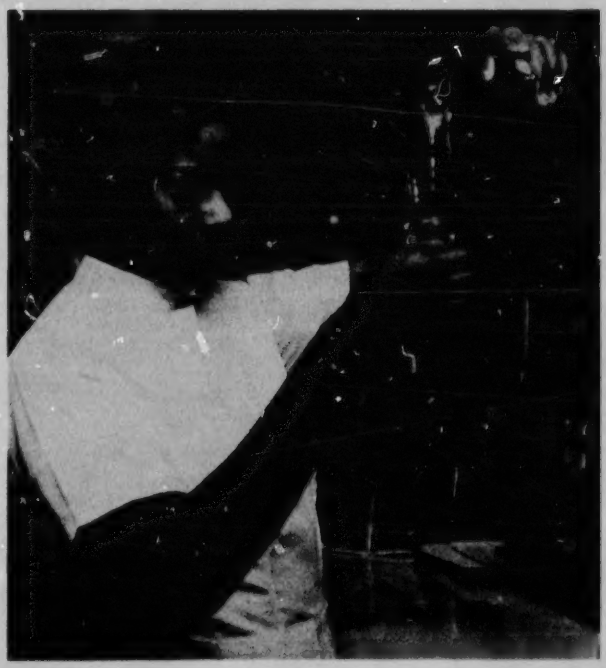
Increases can be seen in the other professions where these groups have been traditionally underrepresented such as dentist, veterinarian, optometrist, podiatrist, and health services administrator. However, these in-

creases have only touched the surface of the need and opportunity for women and minorities in such careers.

Women who represent over 50 percent of the population still represent less than 12 percent of all physicians, dentists, and optometrists. Blacks represent about 11 percent of the population. However, less than 3 percent of our physicians, dentists, optometrists, and pharmacists are black. Blacks, Hispanics, and American Indians represent just over 1 percent of all dentists and optometrists.

To correct this underrepresentation, Congress, Federal and State agencies, and professional associations in the health field are making special efforts to create new educational and job opportunities for women and minorities in these fields.

The trends discussed are not the only ones in health care today. But they may begin to make you aware of what's happening in the health field. So while you look into your future as a health worker, watch carefully the health care system. Be alert to the changes and advances that are reported in newspapers and television today. They may affect how and where you become involved in the health field and may help to guide your future.



## Health Careers: Something for Everyone

The health field, perhaps more than any other career area, offers wide-ranging opportunities which can match almost any interest.

Do you like to work with your hands? Dental technicians, optical mechanics, biomedical equipment technicians, prosthetists, and many other health professionals work with their hands.

Are you interested in working with machines? Respiratory therapists, electroencephalograph (EEG) technologists, and radiologic technologists are just a few professionals who work with patients and medical machines.

Are you fascinated by photography or the fine arts? Art, music, or dance therapist or biological photographer are among the health careers where you can use these talents.

Do you enjoy working with people? Nursing, medicine, dentistry, optometry, social work, rehabilitation, and mental health are some health careers areas that will give you the opportunity to work with, and help, people of all ages.

These careers only scratch the surface of possibilities. Health careers really offer something for everyone; but, too often, students say "no" to health careers simply because they don't have the real facts.

Could you fall into this trap? Let's see. Below are some common statements students make when talking about health careers.

"I couldn't work around sick people in a hospital. That's depressing. Besides I can't stand the sight of blood."

A health career doesn't automatically mean a hospital job or care of the sick. Health careers have many facets. You can work in health care in research, health planning and administration, health education, disease prevention, environmental protection, and other important areas.

Jobs are not just in hospitals. Private doctors' offices, schools, government, industry, and many other places need and employ health workers, too.

But don't judge hospital work until you try it—either as a hospital volunteer or as a part-time employee. You may discover by working there and observing trained health professionals, you, too, can learn to accept the less pleasant parts of helping people get well as a fact of life.

You'll also find that even in hospitals many jobs are "behind-the-scene" with little or no direct contact with patients.

"You need science and math for health careers. That's not for me."

Sure, science and math are required for some health care jobs but many don't require or emphasize these subjects. Health education, social services, and mental health are just a few areas where psychology, social studies, and other subjects are stressed. But even when science and math are needed, different levels of skills are required. Some career occupations like optometrists and scientists require indepth knowledge while many other careers require just good basic skills and working knowledge of these subjects.

"Training takes too long."

Yes, some careers do take 7 or more years preparation after high school. But most require only 2 to 4 years' preparation—not a very big investment considering that most people work *over* 40 years in their lifetime. But 2 to 4 years is just an average. Some can be learned in *less* than 2 years' training, some even on the job. The Health Careers Calendar on page 25 will give you a quick picture of training time for many careers.

"Training costs too much."

In one sense, cost is only relative. It must be balanced against what you can earn. Figures show that lifetime earnings generally increase with years of education. On the other hand, if you don't think you can afford training, you're not alone. Most students today need financial aid for training. The Financial Aid chapter (p. 15 ) will give you the facts.

"The training is too hard."

Don't sell yourself short. Many students who felt the same way are now working as doctors, nurses, therapists, technologists, or as other health professionals. If you think training may be too hard for you, because you've not been doing well enough in school, then think twice. A change of attitude, a special remedial program, or additional study may be all you need to succeed. You might discover by trying that health careeers training is like learning anything new. It can be difficult at first but with time and effort, it is possible.

## Exploring Health Careers

Career exploration is a real learning experience. You don't have to make any definite career decision. Instead you make new discoveries about yourself and the world of work.

While you're exploring, learn as much as possible about each health occupation. Find out: Where, how, and why the health worker performs this kind of work? What skills and knowledge does he or she needs? What is the work setting like? Does the job involve working alone or with others? What are the minimum job requirements in this profession? Is licensure, professional certification, or registration a factor in gaining employment? How much does the job pay? What are the advancement possibilities? Finally, what is the job picture where you live and elsewhere in the country?

How do you start exploring health careers? That's easy. You've already started just by reading about health careers. But don't stop here. The information in this book is just the tip of the iceberg. Read more about health careers. Visit your school or public library. Write to the professional health organizations listed in this book and to the schools that provide training for health occupations.

The information you'll get from books and pamphlets can be very helpful, but it's no substitute for your own firsthand investigation. This requires one special ingredient—you. You must now explore by *doing*. Investigate your health career potential by trying these activities:

*Visit a hospital, laboratory, or other health facility.* Most institutions welcome the opportunity to show their facilities to interested students and the community-at-large. Some may schedule regular guided tours; others may offer these by special appointment. A hospital tour, for example, will give you a good overall picture of the many different departments and jobs which are part of medical care. You'll also learn about the hospital's special services and programs and how it helps the community. You can arrange to visit a health facility by contacting the Director of Public Relations or the Office of the Administrator.

*Visit health occupations schools.* Like health facilities, most schools offer tours or hold open house days where you can meet teachers and students, find out more about the profession, what training involves, and the necessary entrance requirements. Some schools even permit prospective students to spend a day on campus, attend classes, and get a special preview of student life. The admissions office of the school should be contacted to make the necessary arrangements.

*Talk to health professionals and students in health training.* You'll receive a special outlook on the career and obtain information you won't find in any book. Ask them: How did they get interested in and choose their particular field? How difficult is the training? What happens during a typical student day or workday? What do they like most—and least—about their chosen profession? You can meet health professionals and students through exploring many of the activities described here. Your family doctor, school nurse, or guidance teacher may also be able to assist you.

*Work in a health facility or agency.* A part-time or summer job in a hospital, nursing home, laboratory, other health facility, or agency can give you intensive, first-hand experience. Generally you will have an opportunity to observe trained health professionals in action and perform simple tasks. Start your job hunt by making a list of potential health employers, then contact the Director of Personnel of each facility or agency. Find out whether they hire part-time or summer-student help and, if so, how can you qualify. Summer jobs are often hard to obtain so it's important to contact potential employers *early*—several months before the summer season.

*Volunteer in a health facility or agency.* It's not always possible to get a job but almost everyone can volunteer. Generally the only requirements are that you have some free time (3 or 4 hours per week) and are interested in helping others. Hospitals, nursing homes, social service agencies, correctional institutions, and day care or senior citizen centers are among the places where volunteers can be found. Unlike a job where specific work is assigned, volunteer positions are flexible. Every effort is made to assign volunteers to areas of their choice. In general, volunteers provide services which support or compliment those of the paid staff. They do not substitute for regular workers.

What exactly does a volunteer do? That depends on the policy of the individual institution. In hospitals, volunteers assist patients and staff by providing those special extras for which regular staff may not have time. Some examples of volunteer positions are:

- Patient escort: Help transport patients from one area of a hospital to another
- Friendly visitor: Spend time talking to patients, making them feel more at home, perhaps reading to them or writing letters for them
- Messenger: Carry messages for staff from one department to another

- Department aide: Help staff wherever assistance is needed. On a nursing floor this may mean answering a patient's call light and relaying the patient's needs to the nurse in charge. In the Recreation Department, a volunteer might organize and lead a small patient group in a game or other activity.

Volunteers do these tasks and more. New work assignments in both patient and nonpatient areas are constantly being developed to meet the hospitals' needs and the individual interests of their volunteers.

If you'd like to become a volunteer, contact the Director of Volunteer Services of the health facility or agency in which you're interested. He or she can tell you what volunteers generally do at the institution and if there are special requirements. Don't be afraid to let the Volunteer Director know which health careers you're interested in exploring. With this information the director can make a good assignment for you.

*Join health career clubs or programs.* Many schools and community organizations sponsor activities which allow you to explore health occupations. The Girl Scouts, Boy Scouts, and Explorers all have special health career programs. Many secondary and post-secondary schools have a career club. If your school doesn't, you can help start one. Some high schools have prevocational health occupations programs. There is even a national student organization for students enrolled in these programs called the Health Occupations Students of America (HOSA).

To find out whether any of the above activities are going on in your school or community, check with the guidance department, the school nurse, or student health service.

While you're exploring, too, keep an open mind. Investigate many careers, not only those with which you're familiar. Remember the more information you get now, the better your career decisions will be later.

Each year many interested and qualified students give up on a health career simply because they have not explored alternate choices when their first career choice isn't possible. A prime example is the aspiring physician who is not admitted to a medical or an osteopathic school and drops the health field entirely.

The health field is vast; in it you'll find many related careers where you can contribute and find personal satisfaction. The health field doesn't want to lose your talents, so have other options ready.

## Preparing for a Health Career

Whether you realize it or not, you are preparing for your health career right now. Your high school provides the foundation upon which later health occupations training will build.

Even if you haven't chosen a particular career yet, you can still prepare. You can't go wrong taking courses which will improve communications skills like English and writing and courses which will build reading speed and comprehension. If you're considering a science-oriented or patient-care career, take laboratory sciences and mathematics courses, too. These subjects are routinely required in these areas.

Depending on the profession(s) you are considering, a high school diploma, some college, or a college degree will be needed before you begin your training. But regardless of how much preprofessional education is required, the same rules apply: Contact the schools which offer programs for your health profession early. (Most health professions organizations can provide you with a school list). Find out what specific courses are required for admission; then take those courses.

If you are still in high school and are considering a career where graduate school education is necessary, it's still important to contact the professional schools early. This information will help you choose high school courses that will give you a good foundation for your undergraduate education. It will also guide you in later selecting a preprofessional curriculum in college.

Competition for admission to most health careers training is keen. Grades definitely count. Good grades now in all your courses, but particularly in those required for admission will pay off later—when you face that competition.

## Selecting a School for Training

Next to choosing a career, selecting a school for training is the most important career decision you'll have to make. As you read the job requirements in this *Guidebook* you'll discover that health careers training is available in many different kinds of schools: 2-year and 4-year colleges and universities, technical institutes, medical, dental, or other professional schools, hospitals, private vocational, or trade schools, and the military. The challenge, of course, is to choose the school that's best for you.

The secret to selecting the right school is tied to one important question: Will the school you are interested in prepare you for the career you want?

Before you seek the answer to this question, you should understand three basic terms related to employment in the health field:

*Licensure:* Before you can work in many health professions, a State license is required. The qualifications for licensure vary. In general, a student must graduate from a school whose program is *approved* by the State licensing agency, then prove he or she is qualified to give health services by passing a special licensing examination. Licensure is the State's way of protecting the public from unqualified health practitioners.

The health professions which are licensed vary with each State. Some professions like registered nurse, practical nurse, physician, dentist, optometrist, podiatrist, pharmacist, and verterinarian are licensed in all States. The individual State licensing agencies vary, too. The State Education Department, Department of Higher Education, or Department of Health are usually the responsible agencies. Licensing may also be done jointly by a State agency and a State specialty Board of Nursing, Dentistry, etc.

*Professional certification:* Professional certification insures that health professionals meet established levels of competency. Certification is granted by the national health professions organizations, *not* the individual States, so it has national recognition. In health professions where there is no State licensure, professional certification may be required for employment. But even when not required, it is a strong employment asset. Most employers prefer to hire certified professionals, and in a tight job market certification may be the key to getting a job.

All health professions do not have certification programs. The occupational briefs in this book tell you if a career you are considering has professional certification.

In general, to qualify for certification, a student must first complete a program of training recognized by the profession. Usually this means graduating from a school whose program is *accredited* (approved) by the organization. Some organizations accredit programs jointly with the American Medical Association (AMA); then, the student must pass a special certification examination.

*Professional Registration:* Technically, registration means the listing of certified health professionals on an official roster kept by a State agency or health professions organization. In practical terms, some health professions organizations use "registration" interchangeably with "certification."

The licensure, certification, or registration necessary for each career are further discussed under "Job Requirements." If your profession is licensed, you must find out if you as a graduate of this school can qualify for that licensing examination. If certification or registration is required, can you as a graduate of this school qualify for certification or registration?

The State licensing agency and the health professions organizations can best answer this question. Both can provide you with a list of schools whose programs have been approved or accredited. If your school's program is not on that list, don't enroll. It can't prepare you for the job you want.

If licensure or certification is not required in your field, then you must take extra care to determine whether the school you are interested in will prepare you for the job you want.

Contact potential employers and ask: Would you hire graduates of this school? How many have you hired in the last year? Were they hired because of the school's training? Did training make any difference in their starting salary?

Talk to your high school counselor, a counselor at a State employment agency, and graduates of the school's program. (A reputable school will give you the names of graduates upon request.) See how they rate the school.

If possible, visit the school and evaluate the program carefully. How does it compare with its brochure? Is equipment actually available for technical courses? Is the equipment the kind currently used in health facilities or is it outdated? Is there *enough* equipment for students enrolled? If entering the profession requires clinical experience (supervised practice with patients or machines), find out what kind of experience the

program offers. Experience in actual health facilities is always preferred; however, in many careers simulated classroom practice can be an acceptable substitute.

If the school you are interested in attending is a commercial, vocational, or trade school run for profit, the best way to evaluate the quality of the education you will receive is to follow the same guidelines just outlined for nonprofit schools, such as checking to see whether or not you will be able to meet licensure or certification requirements.

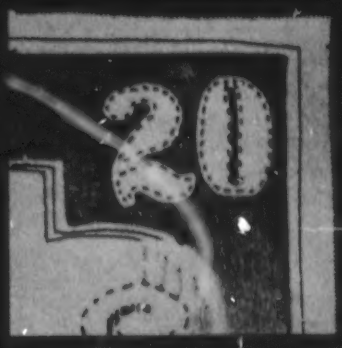
The U.S. Federal Trade Commission recommends that you take some extra steps. Call the Office of the Federal Trade Commission, Chamber of Commerce, or the Better Business Bureau for information about the school. Ask the school about its dropout and job placement rates. Check the school's refund policy should you decide to cancel or drop out. Finally, take the contract home and read it carefully before signing.

There are hundreds of excellent commercial schools that will give you the health career education you are seeking. Some may not. If the school does not measure up, don't take a chance with your future.

You may find that several of the schools you're interested in can prepare you for that career, but you may be undecided on which type of school—hospital, 2-year or 4-year college, etc., may be best for you. Each of these institutions may have a special advantage or drawback which you should consider before making your choice. The advice of the health professions organizations, potential employers, health professionals, and students will steer you in the right direction.

If you follow these guidelines, you are likely to find the school that is best for you. This takes time and work, but it's worth it.

After all, your school is where your future begins.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"It costs too much," is a frequent complaint voiced by students who are interested in education beyond high school. True, higher education is expensive, but careful planning can make it possible. In thinking about your future, don't assume that higher education is out of reach just because it "costs too much."

Financial aid is available to help you and your family meet the cost of education. Each year, over $4 billion in financial aid enables millions of students to continue their education. You could be among them if you begin planning now and apply early.

## What Is Financial Aid?

Financial aid is simply "dollars for education" which come from sources other than you or your family. It may range from a small amount to thousands of dollars annually. Financial aid comes in several forms: scholarships, grants, loans, stipends, and jobs.

Scholarships and grants are "gifts" and do not have to be repaid. Scholarships are usually given for achievement in areas like academic work, athletics, leadership, or community service. In some cases, financial need determines the size of the scholarship. Grants, on the other hand, are usually based solely on the student's financial need.

Loans, unlike scholarships or grants, are borrowed dollars and most must be repaid with interest. Most special student loans programs carry lower interest charges and do not have to be repaid until education is completed.

Some of these loans have special "deferment," "cancellation," or "repayment" clauses. A deferment clause allows students who plan active military or Peace Corps service to put off or "defer" repaying their loan for 3 years until service is completed. A cancellation clause permits a portion of the debt to be reduced or "cancelled" by the Government provided the student fulfills a special requirement, such as working after graduation in a health manpower shortage area. (This is an identified geographic area which is in great need of health workers.) A repayment clause works much the same way; however, in this case the Federal Government repays part of the student's loan in return for special work requirements.

Regular loans, made through commercial banks and used for education, will carry the same interest charges and terms as bank loans for cars, houses, or other items. These interest rates are much higher than those for special student loan programs and repayment begins immediately.

Stipends, a lesser known form of financial aid, are fixed amounts of money paid to students for their services or to reduce expenses. Some hospital training schools offer stipends in return for patient services the students perform. Sometimes, free room and/or board are given in addition to, or as a substitute for, a money stipend. Occasionally colleges may award stipends to exceptionally needy students in addition to tuition aid.

Jobs are another important form of financial aid. This could be a job your school finds for you (either through its job placement office or through a Federal college work/study program) or it could be a job you find yourself.

At the graduate school level, universities offer fellowships or assistantships which are in a sense jobs, since they usually require the graduate student to assist in university activities like research or teaching.

A job can make a big difference in meeting your educational costs; however, before taking a job, your health and your ability to handle the demands of your school work and a job are factors you must consider.

Many students who receive financial aid assistance receive not one but a combination of the financial aid forms just described here. This is commonly called a "financial aid package."

## Will You Need Financial Aid?

If you are like most students today, the answer will be 'yes.' Few families can afford to meet entirely the rising cost of education without some help. So, don't be embarrassed by the thought of applying for and receiving some financial assistance.

But before you can really answer this question, you must look realistically at what you and your family can contribute toward your education and look carefully at your probable expenses.

Simply stated, if your costs are greater than the amount you have available, you will need financial aid.

An open family discussion is a good way to find out what money is generally available for your education and what amount can or will be set aside after considering other extra family expenses.

A budget will help you with the next step—determining the probable costs of your education.

## Budgeting for Health Careers

A budget will help you clearly pinpoint school expenses and give you a better idea of what your education is likely to cost each year. It will also help you to compare the costs of going to different schools.

In preparing your budget, you should include tuition and fees, books, room and board, personal expenses (clothing, laundry, medical, recreation), and transportation.

In addition to these expenses, health career training may have extra costs. Students may be required to purchase special uniforms or equipment or there may be additional laboratory fees.

Clinical work may also add expenses. Often training includes one or more summer clinical sessions for which tuition is usually charged. Some schools may have limited or no nearby clinical training slots. In these instances, students must be placed in clinical training which is sometimes a great distance from the school, perhaps even in another State. This can add unanticipated travel and/or boarding costs.

In planning your health career budget, check the school catalog to find out if any of these costs might apply to you. If so, make sure you add them to your budget.

Health careers offer choices for training which can affect the overall costs. The career you choose, the type of training program you select, where, and how long you study, can influence the cost of education. Let's look at some of the options.

Physician assistant and nuclear medicine technologist are just two examples of health careers where training is free through a military program. Of course, military service is required, but when you return to civilian life you'll be a trained health professional.

Some careers, such as dispensing optician or electroencephalograph (EEG) technologist can be learned either through informal on-the-job or apprenticeship training or through formal education programs. Formal education programs generally charge tuition and other fees. On-the-job or apprenticeship training usually involves few costs and, in most cases, participants earn a small salary.

You can prepare for some health careers like registered nurse or respiratory therapist in a hospital school for the profession or in a college program. Often, but not always, hospital schools have lower or free tuition and they may offer a stipend.

Other professions like radiologic technologist or dental hygienist can be studied in a 2-year or 4-year college program. (You can also study radiologic technology in a 2-year hospital school.) As a rule, the longer it takes to prepare, the greater the costs, but this must be weighed against other factors. Frequently, the longer course "pays off" with higher starting salaries, faster promotions, more job responsibilities, and greater job opportunities.

Health careers which take several years of professional training after college, such as physician, dentist, optometrist, podiatrist, and veterinarian, require special, long-range budget planning.

Most professional school tuitions are high, but there are many financial aid programs for study. (See "Sources of Aid for Health Careers Only," page 19.) A majority of students in these professions rely on loans to finance their education. However, salaries for these professions are generally high and most students find that after graduation they can repay their loans without undue hardship.

## Finding Financial Aid

Once you've discussed finances with your family and then drawn up a budget, you'll have a good idea of whether or not you will need financial aid. Remember, most students do, so be prepared for the next step, finding financial aid.

Individual financial aid programs number in the thousands and tracking them down requires the skills of a good detective. You must be organized and begin very early since good research takes time. Many students lose out because they don't know where to look for financial aid, or how to apply, or they apply too late.

The major sources of financial aid and some of the major programs will be described in this chapter. But this is just a beginning. The majority of programs are at the local level, and these will take time and research to find.

Your guidance counselor, school, or public library and the financial aid office of the school(s) you're applying to, are good starting points for more information.

Your guidance counselor should be familiar with the major aid programs and can often direct you to various local programs.

The school or public library will have several useful books which describe financial aid programs or discuss financial aid in depth. Directories of local and national

organizations found in the library can be helpful in identifying organizations which should be contacted for possible financial aid.

The bibliography at the end of this chapter will help you begin your library search. At the library, check the catalog under such titles as "College," Education," "Financial Aid," "Training," and "Scholarships." Also, ask the librarian for assistance.

You may find, too, that many of the books you'll want to use will be in a special reference section. Since these reference books cannot be taken from the library, take a pencil and paper so you can jot down useful information.

Finally, the school(s) you will be applying to are a very important and a basic source of financial aid information for students. Almost every school has a financial aid program of scholarships, grants, loans and employment. School catalogs usually include a general section describing financial aid programs. The financial aid office of the school should be contacted for a complete program list and more detailed information.

The financial aid office is responsible for managing the school's own aid programs as well as government and independent aid programs in which the school participates. This is the office, too, where students' eligibility for aid, the amount of aid, and how it will be "packaged" are determined.

## What Are the Major Sources of Financial Aid?

Most students find that the school they attend is a key source of financial aid. But it is by no means the only major source.

Financial aid is available from many different sources and many individual programs. Most aid is given for education in general; however, some money is earmarked for health careers specifically. We will look first at general areas and then at those which are exclusively for health careers. Most students will use a combination of sources to finance their health career education, if possible.

The chart on pages 212-214 describes in detail some of the principal aid programs for general education and health careers.

## General Sources of Aid

### Federal, State, and Local Governments

Government-assisted programs, especially those sponsored by the Federal and State governments are a major source of assistance. Programs funded by the U.S. Office of Education are the largest single source of financial aid to students. The Guaranteed Student Loan Program alone lends over 1.2 billion dollars to students annually.

The Social Security Administration and the Veterans Administration also provide financial support to students who qualify.

At the State level, programs vary tremendously. Each State sets its own rules for eligibility and the amount of aid available. The State offices listed on page can supply you with specific information on financial aid programs.

In checking for programs at the local level, the head of your county government or the mayor's office may be able to assist you.

Remember, with all government aid programs, the dollars that are available are linked to laws (legislation) that the governing body passes. In some years a large amount of money may be appropriated; in other years money for financial aid may be cut back. You MUST check on what is the current situation.

### Organizations and Clubs

Many organizations and clubs, at the local and national level, have a long tradition of helping youth through special programs of financial aid and/or counseling. Begin tracking down these programs by making a list of possible contacts. Start with organizations that you or your parents belong to or that are located in your community. Don't overlook these areas:

- Youth groups (Girl Scouts, Boy Scouts, Explorers, 4-H Clubs, YMCA/YWCA, YHA, etc.)
- Civic, fraternal, or service organizations (Chamber of Commerce, Junior Chamber of Commerce, Rotary, Elks, Lions, Kiwanis, American Legion, Knights of Columbus, B'nai B'rith, etc.)
- Special interest organizations (e.g., women's, religious, ethnic, or nationality organizations).

## Business Corporations, Labor Unions, Charitable Organizations, Foundations

Today many of these organizations both large and small promote education through financial aid. Some programs may be restricted to employees or their families, but not all of them are. Make sure your parents check with their own employer or union first. If you are working, contact your own employer as well.

## Banks, Credit Unions, and Other "Lending Institutions"

Unless these sources are participating in or sponsor a special low interest student loan program, *consider them only as a last resort.* Otherwise, their loans will carry interest charges and repayment terms like any other commerical loan.

If you must use this source shop around. Interest charges vary from one bank to another, sometimes as much as 3 percent. Shopping for the lowest interest rate will save you money. Make sure, too, that you carefully read all the terms of your loan agreement before signing.

# Sources of Aid for Health Careers Only

Many of the general sources just described have special programs to help students finance a health career. The Federal and State governments, health-related organizations, and industry are the major supporters of financial aid specifically for the health professions.

## Federal and State Government

For information on State programs for health careers, contact the offices listed on page 215 . At the Federal level, assistance is available through several programs which are briefly summarized here. Because the Government programs change with the laws that are passed each year, you MUST get up-to-date information. *The program descriptions apply to 1977-78.*

- *Armed Forces Health Professions Scholarship Program.* These graduate scholarships are open to students of medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, and clinical psychology at the doctoral level. In return for a scholarship which covers all basic educational expenses and includes a monthly stipend, students must agree to serve a minimum of 2 years of active duty in the armed forces.
- *Federal Insured Student Loans for Health Professions.* This program, which will start in 1978-79 school year, is for graduate health professions students of medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, pharmacy, and public health. Pharmacy students may borrow up to $37,500; all other students may borrow up to $10,000 per year to a combined total of $50,000. Loans may be used for tuition and other education expenses such as fees, books, laboratory expenses. Loan repayment may be deferred during internship and residency training or during service in the armed forces, Peace Corps, National Health Service Corps, or Vista Volunteer program.
- *Health Professions Student Loan Program.* This program provides loans up to the cost of tuition plus $2,500 annually for educational expenses. Graduate students in schools of medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, and pharmacy are eligible to participate. Loan repayment may be deferred through service in the armed forces, Peace Corps, or certain other specified programs.
- *Health Professions Loan Repayment Program.* Borrowers who are willing to work after graduation in a health occupation shortage area may obtain up to 85 percent loan repayment by the Federal government.
- *Scholarships for First-Year Students of Exceptional Financial Need.* The program will commence with 1978-79 school year and is open to first-year graduate students in schools of medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, and pharmacy. This scholarship program covers tuition and all other reasonable educational expenses and includes a stipend of $400 per month for living expenses. This program does not have any work obligation requirements after graduation.
- *National Health Service Corps Scholarship Program.* This program is for students enrolled in professional studies to become doctors of medicine and osteopathy, dentists, registered nurses (at the bachelor's level), nurse practitioners, nurse midwives, public health nurses, public health nutritionists, speech pathologists and audiologists, and medical social workers. The scholarships cover

all required tuition and fees and include $400 per month stipend for living expenses. In return for the scholarship, the student must agree to serve a minimum of 2 years in the National Health Service Corps, a special government program which supplies health personnel to labor shortage areas, or another unit of the U.S. Public Service.

- *Nursing Scholarship Program.* Full-time or half-time beginning registered nursing students with exceptional financial need are eligible for this program. Scholarships up to maximum of $2,000 per year are available to cover necessary school expenses.
- *Nursing Student Loan Program.* Loans up to a maximum of $2,500 for each academic year are available to half-time or full-time beginning registered nursing students. Up to 85 percent of the loan may be canceled if upon graduation the borrower works as a registered nurse under certain specified circumstances. Student loan repayment may also be deferred for service in the Peace Corps, the armed services, or full-time advanced nursing study.
- Nursing Loan Repayment Program. Borrowers who agree to work, after graduation, as registered nurses for a specified period of time in a designated shortage area for nurses may have up to 85 percent of their loans repaid by the Federal Government.

## Hospital Auxiliaries, Medical and Dental Societies

These local organizations frequently provide financial aid for medicine, dentistry, nursing, and other allied health study. Consult the Yellow Pages for their local listings. Ask your doctor or dentist and contact your local hospital(s). Again, the library may be helpful for local listings of health related organizations in your area.

## Professional Organizations for Individual Health Occupations

Both national and/or local chapters often sponsor financial aid programs for the individual health occupation which they represent. A list of the national organizations is located on pages 206-208. Those which have indicated they sponsor financial aid programs or have financial aid information available are designated by an asterisk (*). Local chapters should not be overlooked. The national organization should be able to put you in touch with a local chapter in your community or State.

## Organizations Concerned With Health and Corporations

Again, national and local branches of these organizations should be contacted. Voluntary health organizations such as The National Foundation-March of Dimes or the National Easter Seal Society of Crippled Children and Adults are involved not only in research on health problems but frequently promote health by sponsoring financial aid programs for future health workers. Examples of corporations or health-related industries are drug manufacturers, health and hospital suppliers, and health insurance companies.

In addition to these sources, many organizations and clubs discussed under general sources of aid may sponsor programs specifically for health careers.

If a career in which you are interested does not have a specific financial aid program, don't be discouraged. Those general sources of financial aid are still available to you and many students in health professions rely solely on them to finance their education. Don't forget, too, many universities or other schools training for the health professions have special aid programs which are designated for specific health careers. Contact the individual health professions department within the school for information.

# Are You Eligible for Financial Aid?

There's no quick answer to this question. Eligibility depends on the type of aid you are applying for, the program's specific eligibility requirements, and your own unique circumstances. If you have any doubts about whether you could be eligible for aid or not, APPLY.

Increasingly, financial need is *the* major eligibility requirement for most financial aid programs.

As mentioned earlier, a family meeting and budget will help you estimate the costs and dollars available for your education. If costs are greater, you *may* be eligible for financial aid. Whether you are eligible or not also depends on how much your family is expected to contribute, since most aid is based on the concept that parents have an obligation to pay for education as far as they are able. This does not mean, though, that they are expected to wipe out all their savings and assets or severely reduce the family's basic living costs to do so.

Today, most schools and independent programs use a uniform "needs analysis" system to determine expected family contribution and your financial need. This

system compares your family with other families of similar income and assets. It makes special allowances for the size of your family, the number of dependents attending postsecondary schools at the same time, special child care expenses, medical and dental expenses, and major debts which the family may owe.

Many students and parents assume incorrectly that they're ineligible for financial aid because of gross income or assets. While a family of four with an income of $15,000 or less is almost always automatically eligible for some kind of aid, families with incomes of $25,000 or more may also be eligible depending on the special allowances.

The needs analysis system requires that you and your family complete a special Financial Aid Form (FAF) or Family Financial Statement (FFS) which asks for detailed information.

Both forms accomplish the same thing—needs analysis. It is the choice of the individual school or financial aid program as to which form is required.

The FAF is administered by the College Scholarship Service (CSS), the FFS, by the American College Testing (ACT) Program. Forms are generally available at high schools, postsecondary schools, or by writing:

CSS, Box 2700, Princeton, NJ 08540, or ACT Student Assistance Division, P.O. Box 168, Iowa City, Iowa 52240

Completing the form is much like completing an income tax statement. Like an income tax statement, all information is *strictly* confidential. The form asks for such information as:

- Yearly wages, salaries, tips and other compensation
- Other income (dividends, interest, social security, pensions, welfare)
- Amount of assets (value of home, business, cash, savings, checking accounts)

The form also has a "student contribution" section. Students, as well as parents, are expected to contribute to the cost of their education through gifts, savings, summer and part-time earnings. The student's expected contribution for the first year is about $500. (The figure is slightly higher for each additional year.)

Some students may wonder whether they would be more eligible for aid if they moved away from home and applied on their own. This is not usually the case. Very strict guidelines have been established to determine if students qualify for independent status. Most students would not qualify unless, for several years, they had been self-supporting, had maintained their own residence, and had received little or no financial support from their parents. Even students who meet these conditions may still be asked by some schools for parental information.

Once the FAF or FFS is completed it is sent to a special processing center for analysis. A report is then sent to the schools and independent aid programs you designate. They will use this report to determine if you meet their standards of need and or the amount of aid for which you are eligible.

If you don't qualify on the basis of need, don't give up. Not all financial aid is based on need. The Guaranteed Student Loan Program, for example, is available to students irrespective of family income (see pages 217-218). Many schools offer scholarships for academic or athletically gifted students. Don't forget, too, those numerous local sources for financial aid. They have their own individual requirements for which you may qualify.

## How To Apply for Financial Aid—Some General Guidelines

Have you identified all your potential financial sources? Have you estimated your educational costs and how much money you will have to meet them? Have you determined how much aid you'll probably need? If so, you are ready for the next step, applying for financial aid. Here the calendar becomes important. You must allow plenty of time to:

- Request and receive financial aid information and application forms.
- Read the information you receive.
- Gather any financial aid or personal data which you must provide.
- Complete the application forms carefully.
- Mail the forms so they will reach their destination *before* the deadline date.

In applying for financial aid, don't let the application forms discourage you. Many students have found that the time and work it takes to complete the forms are well worth the effort.

Before you or your parents attempt filling out the form, read it and any instructions carefully and completely. Make sure, too, that any necessary information such as an income tax statement is on hand.

If you have difficulty in completing a form, ask your guidance counselor, an interested teacher, or other adult for assistance.

Once the form is completed, check and double check it. Make sure that all sections are completed correctly and legibly, all supporting data are attached, and that it has all the necessary signatures.

Before mailing, make a photocopy if possible. This will serve as a record of when the application was sent and can act as a back-up in case the application is not received. (Some students use certified mail for these applications so that they will know for sure that the forms have reached their destination.) The photocopy can serve as a reference when completing other applications since programs frequently ask for identical or similar information.

Keep track of all the programs for which you apply. Set up a financial aid folder which lists: the programs to which you have applied, their deadline dates, dates your applications were mailed, and dates when financial aid will be announced.

You will also want to keep in this file any letters you may send or receive concerning your applications.

Most students make several applications for financial aid which can be grouped into two general catagories: school aid and all other independent assistant programs. The general rules already outlined should be followed in applying for both kinds of financial aid programs. However, in applying for each keep the following in mind.

## Applying for School Aid

When you request a school catalog and admissions application, ask for financial aid information and application forms as well. You needn't worry that applying for financial aid will hurt your chances for school acceptance. Admissions and financial aid are almost always considered separately. Most students who apply for admissions, also apply for financial aid.

Once you get your application form, check the financial aid deadline. In many cases it is *different* from the admissions deadline. Check also to see whether the FAF or the FFS is used to record the family's financial information. (Most schools will routinely send you the necessary form.)

After completing the form, mail it to the processing center *well ahead of your school's financial aid deadline date*. (Four to 5 weeks is suggested.) This allows enough time to process your statement and send a "needs analysis" to your school prior to the financial aid deadline date.

Finally, in addition to the Financial Aid Form (FAF) or Family Financial Statement (FFS), most schools will require you to complete *their own financial aid application forms*. These forms must be mailed to the school prior to the deadline date also.

## Applying for Independent Aid Programs

All programs not sponsored or administered by your school fall into the independent aid category. Each program will operate differently and set its own eligibility requirements, as well as have its own application forms and procedures.

Some independent programs for which financial need is an eligibility requirement have their own financial aid form or reserve a section on their general application for this purpose. Others use the standard FAF or FFS to verify eligibility. Still others may require a statement from the school you will be attending as proof of need.

If you are selected for financial aid, most independent programs will notify you directly.

## Basic Education Opportunity Grant

The Basic Education Opportunity Grant (BEOG), a Federal program, is an example of a major independent financial aid program for education after high school which is *not* administered by the school. Many schools consider the BEOG as *the* basic financial aid building block and insist that students apply first for the BEOG before they will consider giving them other financial aid assistance at the school. Students often misunderstand how the BEOG works, so it deserves special attention.

You can apply for the BEOG simply by checking a special box on the FAF or FFS. Or if you prefer you can complete a special BEOG application form that includes a financial statement.

Within a few weeks you will receive a "student eligibility report" (SER) notifying you of BEOG eligibility. Instead of stating a dollar amount to which you are entitled under a BEOG, the report will rate your financial need on a scale of "0" to "10." The SER must be taken to the financial aid office of the school where your rating will be translated into a dollar figure.

Your BEOG rating is worth different amounts at different schools and only the school can accurately interpret your index.

The size of the BEOG depends on the school's costs. The more costly the school, the larger the BEOG. At a public school the rating may translate into $500, while at an expensive private school the same rating may be worth $1,000.

Students and parents are sometimes confused by this rating system. If the BEOG rating is "0," they assume they are entitled to nothing and throw the SER away. Actually "0" is the highest rating and the student is eligible for the greatest amount available through the BEOG program at that school.

So, to avoid mistakes, don't try to interpret the rating yourself, take it to the financial aid office of your school.

## What Financial Aid Will You Receive?

This answer varies with each student, each school, and each financial aid program. As mentioned earlier, most students receive assistance as a financial aid package which combines several forms of aid.

A financial aid officer at the school is responsible for designing this package after carefully looking at each student's situation. The officer takes into account the student's financial aid eligibility, financial need, and any other financial aid which the student has already received from other sources. The student's eligibility for BEOG and State aid are also considered.

The financial aid officer determines how much aid the student will receive, how it will be packaged, and notifies the student. Because of the large number of financial aid and admissions applications, this determination is generally not made at the school. Some schools, if the financial need is $500 or less, will only offer financial aid as employment or an educational loan. Other schools will handle this same situation differently.

Students with identical financial need within the same school or attending different schools may receive different packages. This decision depends on the school's particular financial aid policy and the overall amount available at the school for financial aid.

Let's look at some possible combinations.

A student needs $2,000 to attend school A or B, which are private institutions, and $800 to attend school C, a public one. The student applies for financial aid at each school. After reviewing all factors, the financial aid officers of the schools distribute their aid as follows:

*Private institutions*

| A | | B | |
|---|---|---|---|
| 70 percent grant | $1,400 | 45 percent grant | $900 |
| 30 percent loan | $600 | 40 percent loan | $800 |
| 0 percent work | —— | 15 percent work | $300 |
| 100 percent need | $2,000 | 100 percent need | $2,000 |

*Public institution*

| C | |
|---|---|
| 0 percent grant | —— |
| 50 percent loan | $400 |
| 50 percent work | $400 |
| 100 percent need | $800 |

Private institutions A and B have a large financial aid fund upon which to draw. The officers at these schools can offer the student greater financial assistance than the public institution C. This is not uncommon. Many private institutions receive generous contributions from many sources which enable them to offer, generally, more assistance than the public institutions which rely principally on government funding.

School A offered the student, who had a good academic record, more grant money than B. This decision was based on school A's policy of attracting gifted students through financial aid.

Schools A, B, and C are just examples to show you how financial aid can be packaged differently. Each school handled the student's situation. Keep this in mind if you are applying to and are accepted by more than one school. You may receive more aid and a better package at one school versus another.

In the examples here, the students received 100 percent of their need at each school. In real life this doesn't always happen.

Be prepared to make adjustments when necessary. You may not be able to attend your first-choice school or live on campus. You may have to take an extra loan or another part-time or summer job you hadn't planned on. But in the end, what really counts is that you'll be moving closer to a worthwhile future.

## Some Reminders

Situations change. A family member may lose a job, a new dependent may be added to the family, or there may be a sudden, unexpected medical expense. These and other changes can affect your eligibility for financial aid.

To help you receive all the aid you are entitled to, your financial aid officer must know about these changes as soon as possible.

If you receive financial aid you will have to reapply each year to evaluate your current circumstances. If you are not eligible for aid this year, try again next year. In addition to family changes, inflation causes many financial aid programs to revise their income eligibility requirements annually.

## A Final Word

Financial aid is not getting something for nothing. You must earn it with your time, effort, organization, and perserverance, but it does pay off. And it pays off where it counts the most—your future. So, don't be discouraged by the process of applying for financial aid; make the investment. Start your financial aid planning now and start moving one step closer to your tomorrow.

## Financial Aid Bibliography

*Need a Lift*? American Legion Education Program, P.O. Box 1055, Indianapolis, Ind. 46206. (50 cents per copy.) Discusses financial aid programs that are available nationally for various careers.

*Helping Hands: Financing a Health Career,* American Medical Association, 535 North Dearborn Street, Chicago, Ill. 60610. (Free) Suggests various ways to look for financial aid.

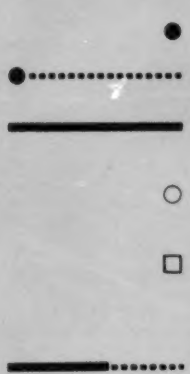
*Meeting College Costs,* College Board Publications Orders, Box 2815, Princeton, N.J. 08540. (Free) A discussion of how to apply for financial aid.

*Directory of Special Programs for Minority Group Members: Career Information Services, Employment Skills Banks, Financial Aid,* ed. W. L. Johnson, Garrett Park Press, Garrett Park, Md. 20766. ($6.95 per copy.) Lists and describes various types of educational assistance programs for students from minority groups, including scholarships, loans, and other financial aid programs. Contains special section on employment assistance services for women.

*College Costs Today,* New York Life Insurance Company, 51 Madison Avenue, New York, N.Y. 10010. (Free.) Presents tuition and enrollment figures for over 1,000 accredited colleges and universities in the United States.

*Guide to Financial Aid for Students and Parents,* by Elizabeth W. Suchar, Simon and Schuster, Inc., Reference, Technical, and Review Book Division, 1 West 39th Street, New York, N.Y. 10018. ($4.95 per copy.) The Official College Entrance Examination Board Guide to finding and obtaining financial aid.

This calendar gives you a quick check on how many years of education, after high school, you should count on for the representative health occupations listed here. The lines and symbols show what is customary—some people take only minimum required training; many take more.



● Requires no special training.

●..... Entails an apprenticeship, special course, or on-the-job training.

——— Requires special training in college, a hospital, special school, or a professional school after 1 to 4 years of college.

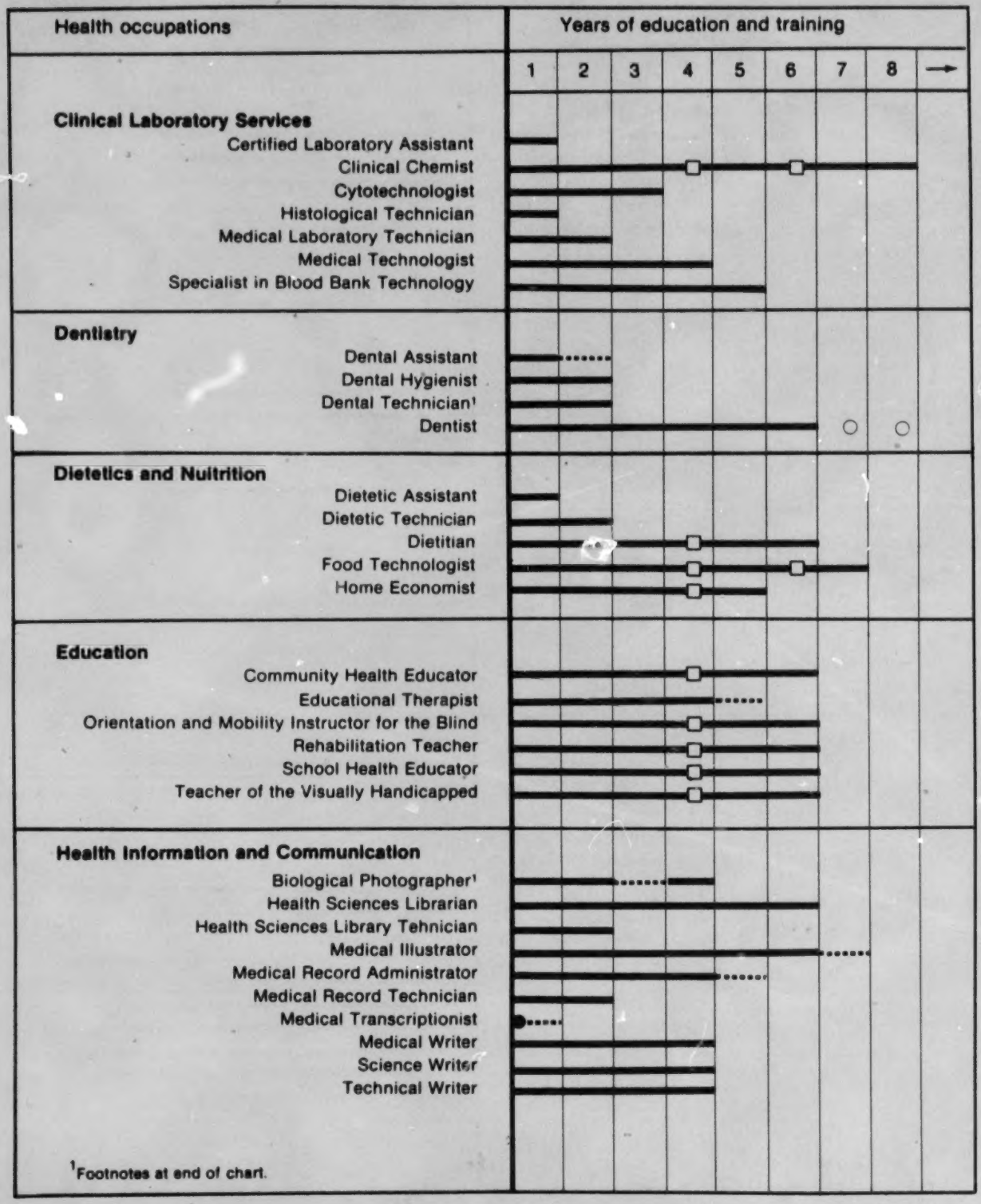
○ Though the line shows the minimum period to qualify, more preprofessional years in college lengthen the total training time.

□ First square means one can get a junior professional job after college. Subsequent squares indicate that more study--to or beyond the master's or doctor's degree--as well as experience is usually needed for advancement.

———..... Requires special training of varying periods of time.

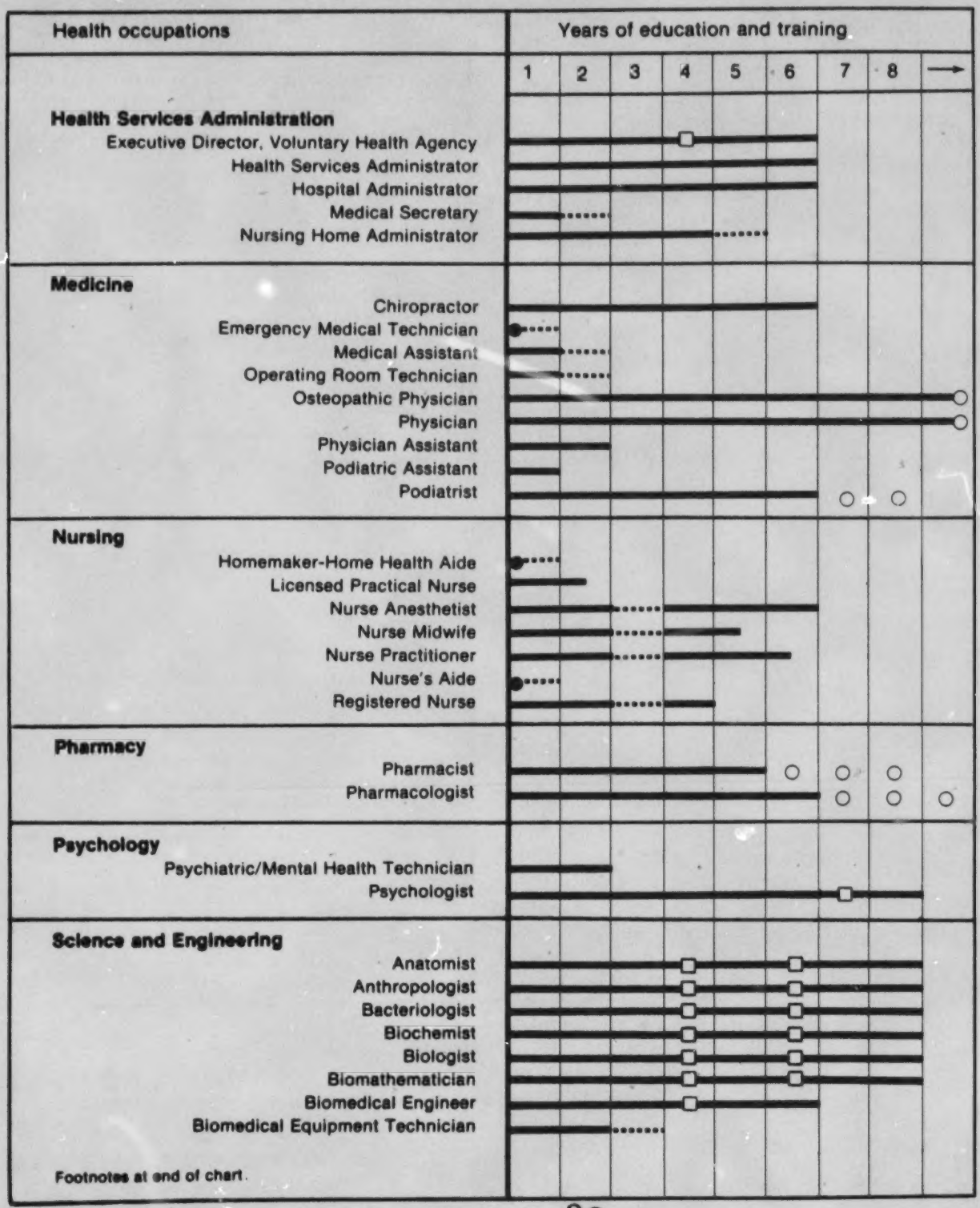
This calendar pictures training information in condensed timetable form. To get a more detailed picture, read the *Health Careers Guidebook* Occupational Descriptions and consult your school advisers for information and personal guidance on training and the local outlook for the career you want.

## Years of Education and Training Beyond High School For Careers in Health Occupations




[1]Footnotes at end of chart.

## Years of Education and Training Beyond High School For Careers in Health Occupation--Continued

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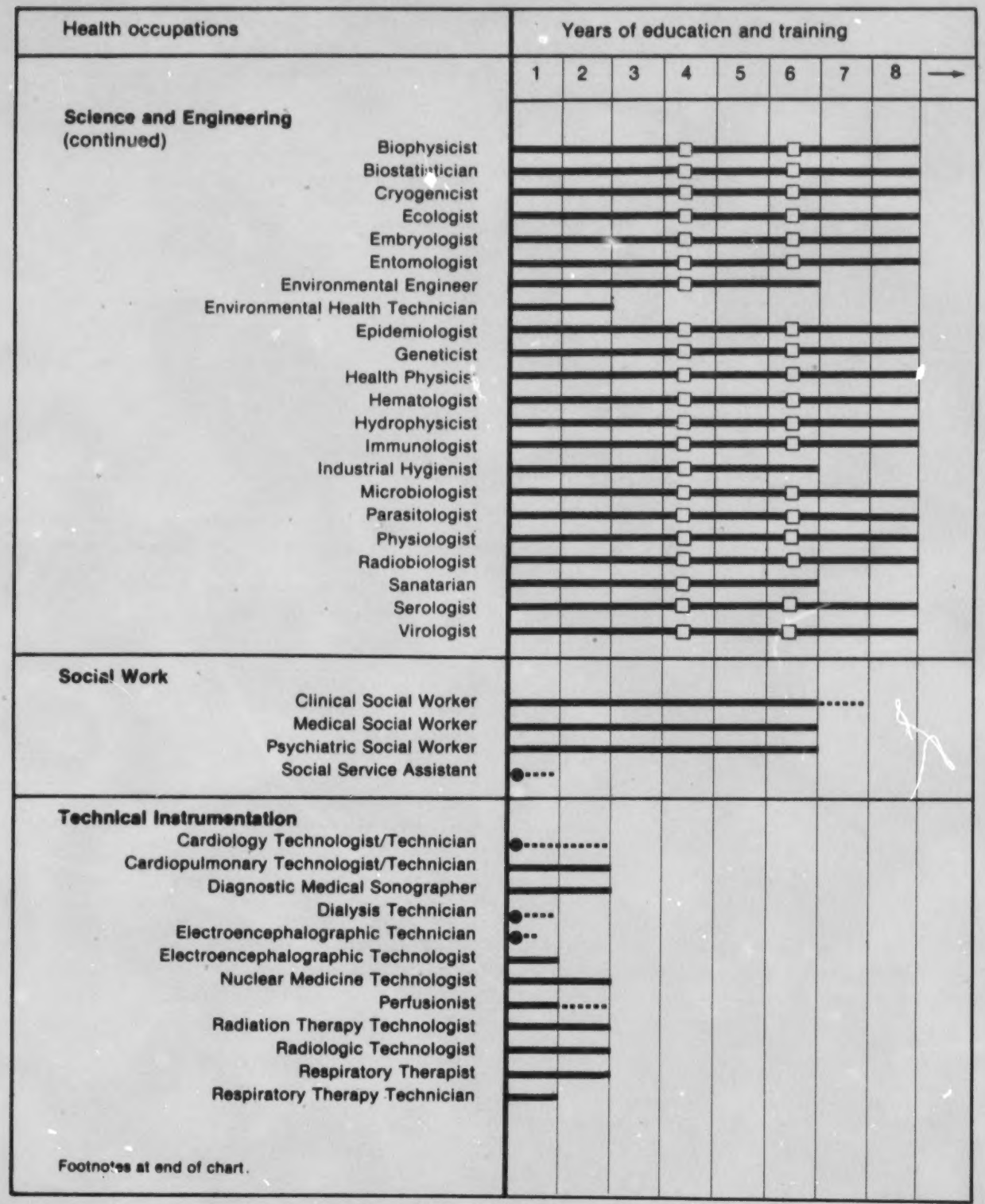
## Years of Education and Training Beyond High School For Careers in Health Occupations--Continued

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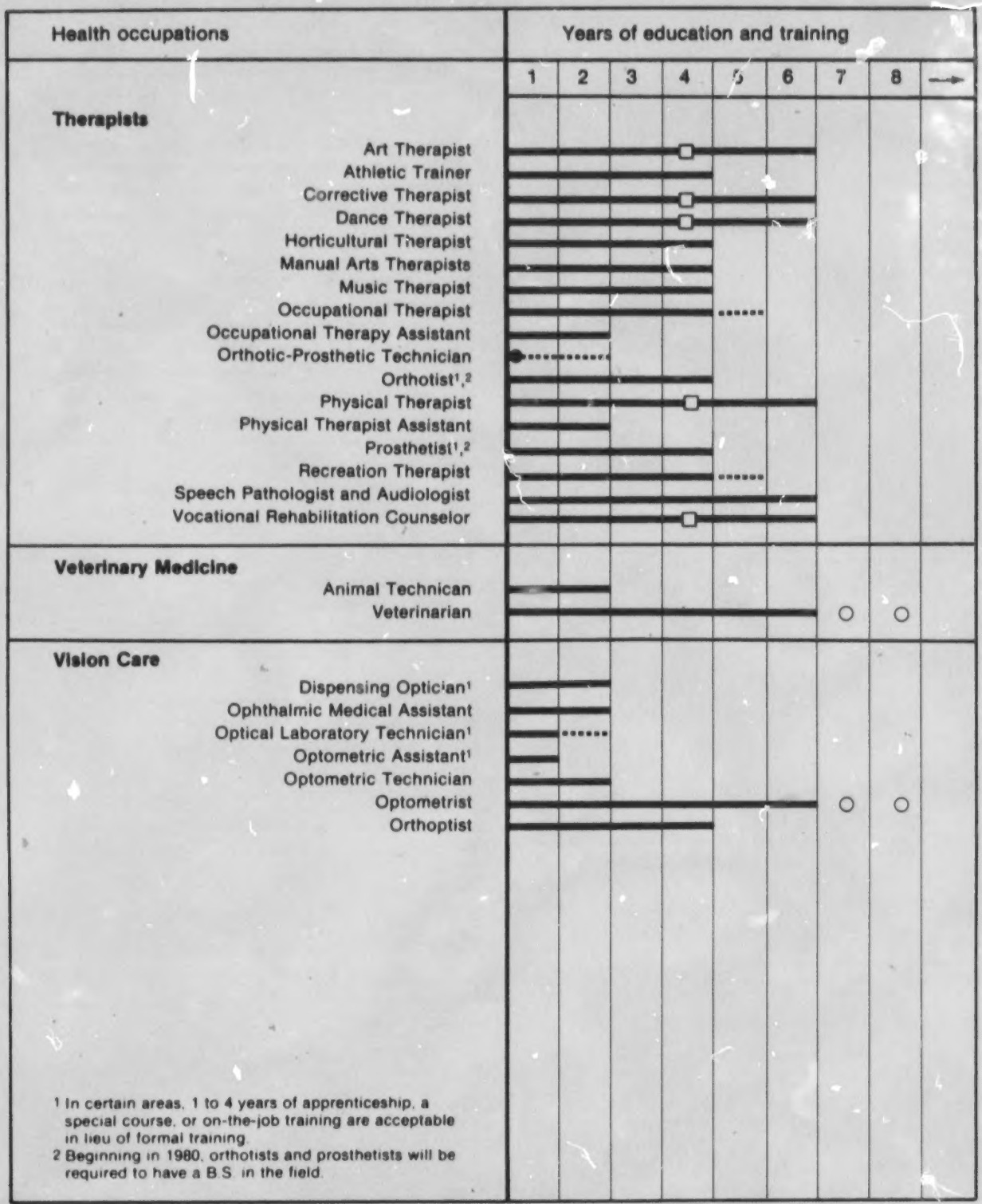
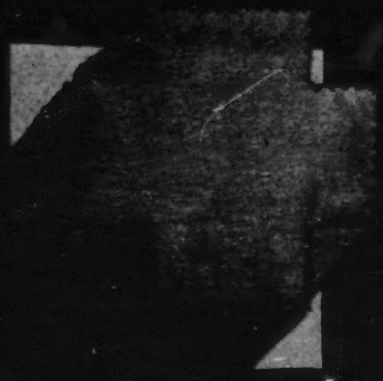
## Years of Education and Training Beyond High School For Careers in Health Occupations--Continued




1 In certain areas, 1 to 4 years of apprenticeship, a special course, or on-the-job training are acceptable in lieu of formal training.
2 Beginning in 1980, orthotists and prosthetists will be required to have a B.S. in the field.

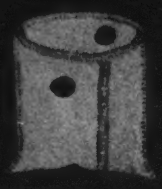


Each career is listed under its preferred occupational title. Each career description is organized into four basic sections which will assist the reader in comparing careers.

- The opening section lists alternate titles by which the career is known and describes what workers in this profession do on the job. Major job duties, how and why they do this work, places of employment, and areas of specialization within the field, if any, are also discussed.
- The JOB REQUIREMENTS section outlines how to qualify for a job in this profession. Information covers: necessary professional training, recommended or required preprofessional education, any special skills or aptitudes necessary or helpful for successful job performance, state licensure, professional certification, or registration, and other factors related to employment. (For an explanation of these terms see page 13.)
- The OPPORTUNITIES section indicates the future employment outlook for the professional and major factors which may influence the job market. Also discussed are the opportunities for advancement within the career and any additional qualifications needed for advancement.
- The closing section lists, where applicable, current *Dictionary of Occupational Titles*[1] code numbers, a Government system for classifying occupations. Included also is a source for more information about the health career. The address of each organization supplying this information is found in the WHERE TO GET MORE INFORMATION section on page 205.

[1] Published by the U. S. Department of Labor. Fourth edition, 1977.

Clinical Laboratory Services



44

Physicians utilize a number of tests and devices which make a general appraisal of a patient's condition—taking the patient's pulse, temperature, and blood pressure; listening to the heart and lungs with a stethoscope; looking into the nasal passages with a nasoscope; or into the eyes with an ophthalmoscope. With these instruments, the physician can detect gross changes in the functioning of the various organs, and, in most common illnesses, make a diagnosis.

But there are many illnesses whose symptoms are not so easily detectable. These are illnesses in which there are changes in the body fluids and tissues not noticeable by observation. They include chemical changes in the blood, urine, lymph; increases or decreases in the count of various types of white or red blood cells; microscopic changes in the structure of the cells of a diseased tissue or organ; and the presence of parasites, viruses, or bacteria in the blood or diseased tissue.

To detect these, physicians must send specimens of blood, urine, or tissue for a variety of highly technical tests performed in the laboratory. Combining laboratory findings with other observations, they are then able to make an accurate diagnosis.

Laboratory examination of body fluids and tissues serves other purposes as well. Blood tests must be made to determine blood types when a blood transfusion is needed. There are certain blood types which if combined in conception, produce abnormal offspring, and these types can be detected by laboratory tests. Some individuals have violent allergic reactions to different kinds of medications, and laboratory tests are used to detect this type of sensitivity.

Although physicians need the results of these tests for evaluation and diagnosis, they do not conduct the tests themselves. Instead, these tests are made by clinical laboratory personnel. These specialists provide laboratory services ranging from routine tests to highly complex analyses, and their skill and education levels differ significantly. In the following pages, several specialties in clinical laboratory services are discussed in detail to point out the variety of career choices available in this area of work.

## Certified Laboratory Assistant

The certified laboratory assistant performs a variety of routine tests and procedures under the direct supervision of a medical technologist or physician. The certified laboratory assistant works in all areas—bacteriology, chemistry, hematology, parasitology, serology, blood banking, and urinalysis. Special tasks performed include collecting blood specimens, grouping and typing blood, preparing and staining slides for microorganisms, analyzing body fluids for chemical components, and examining urine, blood, and body fluids with the microscope. In large laboratories, the assistant may concentrate in one area of work such as the preparation of blood smears in hematology. In addition to performing routine tests, assistants may store and label plasma; clean and sterilize laboratory equipment, glassware, and instruments; prepare solutions following standard laboratory formulas and procedures; keep records of tests; and label specimens.

Most laboratory assistants work in hospitals; however, some work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. These places are often located in large cities and populous States. Medical laboratory assistants generally work a 40-hour week and, in hospitals, some night and weekend duty can be expected. Assistants usually work closely with medical technologists, pathologists, and other laboratory personnel. Laboratories are generally well-lighted and clean. Although unpleasant odors and specimens of many kinds of diseased tissue often are present, few hazards exist if proper methods of sterilizing and handling specimens, materials, and equipment are used.

### Job Requirements

The certified laboratory assistant (CLA) program was established in 1963, and as of January 1975, there were 183 CLA schools accredited by the Committee on Allied Health Education and Accreditation of the American Medical Association. Accuracy, dependability, and the ability to work under pressure are necessary characteristics for persons considering this career. In addition, manual dexterity and normal color vision are desirable. Graduation from an accredited high school, preferably with an ability and interest in science and mathematics, or a certificate of equivalency is required for admission to an accredited school. The 12-month course of practical and technical education includes classroom instruction plus laboratory training. CLA schools are

primarily in hospitals, although in some areas they are located in technical schools, community colleges, and on military bases. Graduates who pass the American Society of Clinical Pathologists (ASCP) Board of Registry examination may use the letters CLA (ASCP) after their names which indicates that they are certified laboratory assistants.

## Opportunities

Hospitals and other facilities throughout the country are expected to continue to need competently trained laboratory assistants to meet demands for laboratory services and to free medical technologists and medical laboratory technicians for the more complex, highly technical procedures. Employment of laboratory assistants is expected to decrease in urban areas and increase in rural areas. The number of persons seeking to enter the field of laboratory assistants is expected to exceed the number of openings from growth and replacement needs. Consequently, persons seeking jobs in this field may face competition for positions of their choice. A certified laboratory assistant may advance to the medical laboratory technician level by acquiring an associate degree from an accredited institution.

DOT Code: Medical Laboratory Assistant 078.381-010

For further information, contact:
The American Society for Medical Technology
American Society for Clinical Pathologists

## Clinical Chemist

Clinical chemists use chemical tests, procedures, techniques, and equipment of varying complexity to obtain information used in the diagnosis and treatment of disease. They perform, or direct other laboratory personnel who perform, chemical tests on blood, serum, urine, spinal fluid, and other body materials to gather clinical data. Clinical chemists detect abnormalities in the amount of proteins, hormones, enzymes, and other constituents in the body. They also are concerned with the analytical and research aspects of disease states, toxic substances and drugs, including metabolism and effects on body functions at the tissue and organ levels. Clinical chemists are responsible for insuring that their test results have a high degree of reliability, since many of these data are utilized by physicians as part of any clinical assessment of a patient.

Teaching and training persons in clinical chemistry can be part of clinical chemists' responsibilities, and they may engage in administrative or managerial activities in such positions as supervisor or laboratory director.

The majority of clinical chemists work in private or hospital laboratories, while the remainder work in private industry, Government agencies, and educational institutions.

## Job Requirements

Persons considering this career must have such qualities as analytical ability and the capability of working precisely, both independently and as part of a team.

The educational minimum for a limited number of entry positions in this field is a bachelor's degree in chemistry or biochemistry. However, the majority of clinical chemists have a master's, Ph.D., or M.D. degree and find substantially greater employment opportunities. The National Registry in Clinical Chemistry, through an examination, certifies clinical chemists with a doctoral, master's, or bachelor's degree who meet specified qualifications. Those who qualify receive the designation of clinical chemist (CC) or clinical chemistry technologist (CCT).

The American Board of Clinical Chemistry (ABCC), through an examination process, certifies clinical

chemists who have a doctoral degree plus substantial experience in the field. They issue those who qualify the designation of diplomate (DABCC).

The American Society of Clinical Pathologists (ASCP) also certifies clinical chemists who meet specified requirements and issues the designation of Spec C (ASCP).

### Opportunities

Job opportunities for clinical chemists with advanced degrees are expected to be favorable during the next decade. Qualified clinical chemists can advance to supervisory or administrative positions, enter research or teaching activities, or become proprietors of clinical laboratories. Advancement in the field is generally governed by experience, work expertise, and continued studies at higher levels.

DOT Code Clinical Chemist 041.061-026

For further information, contact:
**American Association for Clinical Chemistry**

## Cytotechnologist

The cytotechnologist is a trained laboratory technologist who works under the direction of a pathologist. The prime responsibility of the cytotechnologist is to detect cell changes caused by different disease processes. These specialists prepare cell samples, obtained from various body areas, for examination by using special staining techniques which make the specimens more visible. Smears of the cell samples are then placed on slides, inserted under a microscope, and examined by the cytotechnologist. Cytotechnologists are trained to recognize minute abnormalities in the color, size, and shape of cell substances, and, in many cases, their findings are the first warning signs of cancer. As a result, physicians are able to diagnose and treat cancer long before discovering its existence by alternate methods. In addition, cytotechnologists also use a variety of methods to detect abnormal hormone conditions.

Most cytotechnologists work in a hospital, clinic, or private laboratory. Laboratories are usually well lighted and clean. Specimens of different kinds of diseased tissues and unpleasant odors are often present, but few hazards exist because of safety procedures employed in laboratories.

### Job Requirements

The minimum education preparation for this career includes graduation from high school or its equivalent plus 2 years of college with 12 semester hours in science, at least 8 of which must be in biological science. An individual who is a certified medical technologist MT(ASCP), or has a bachelor's degree in science from an accredited college or university may also be eligible for admission to this program. This is followed by a 12-month cytotechnology course accredited by the Committee on Allied Health Education and Accreditation of the American Medical Association. The course consists of classroom study and practical laboratory experience dealing with normal and abnormal cell variations in body systems. The education program is conducted under the close supervision of experienced cytopathologists and cytotechnologists. Upon successful completion of this 12-month formal study, the student is eligible for the certifying examination given by the Board of Registry of the American Society of Clinical Pathologists. Those who pass may use the designation CT(ASCP) after their names. The National Certifying Agency for Medical Laboratory Personnel will also administer a certifying examination, and the in-

dividual who passes this examination will be designated by the letters CLSp-CT. Many States have licensing requirements for cytotechnologists, and the appropriate agency should be contacted to determine exact legal standards.

## Opportunities

The employment outlook for cytotechnologists is favorable, with the demand for trained workers exceeding the supply at this time. This trend is expected to continue but many jobseekers may have to choose work locations outside of large urban areas, where competition for available openings is considerable. Cytotechnologists can advance to supervisory positions, move into research activities, or become teachers in their fields. In any case, advancement is based on experience, skill level, and the completion of the advanced education courses.

DOT Code Cytotechnologist 078.281-010

For further information, contact:
American Medical Technologists
American Society for Clinical Pathologists
The American Society for Medical Technology
The American Society of Cytology

## Histologic Technician

The histologic technician, using specialized or routine methods, prepares sections of body tissue for microscopic examination by a pathologist. This includes specimens of human and animal tissues used for diagnosis, research, or instruction. The histologic technician prepares portions of body tissues selected for examination, freezes and cuts tissue samples, mounts them on slides, and stains them with special dyes so that specific structural details or substances will be visible under the microscope. Often while the team in surgery waits, it is the histologic technician who prepares the tiny sections of the patient's body tissue for the microscope examination that will determine whether body malfunction or malignancy are present. The histological technician must perform these procedures using good skills, knowledge, and judgment.

With the recent advances in technology, histologic technicians are specializing in techniques involving the use of the electron microscope or special studies which help determine a patient's diagnosis. Histologic technicians may also work with a wide variety of sophisticated instruments which are manually operated or semi-automated.

Most histologic technicians work in hospital laboratories and are required, at times, to work shifts and weekends. The working conditions in laboratories are generally good, with clean, well-lighted surroundings. Specimens of different types of diseased tissue and unpleasant odors are usually present; however, few hazards exist because of the safety procedures employed in modern laboratories.

## Job Requirements

Persons considering this career should be interested in the physical, chemical, and biological sciences and be able to perform work in a precise, dependable, and responsible way. In addition, manual dexterity and normal color vision are essential. The basic educational preparation for this career includes graduation from high school or the equivalent, plus the completion of a 1-year course accredited by the American Medical Association Committee on Allied Health Education and Accreditation. Programs are usually given in a hospital or laboratory facility. Some of the subject areas studied in this program include histochemistry, anatomy, histology, laboratory mathematics, microscopy, processing techniques, preparation of specimens, medical terminology, and chemistry.

After completing the training program, the graduate can receive certification from several different agencies. The National Certifying Agency for Medical Laboratory Personnel will administer an examination for the histologic technician. The individuals who pass the examination will be certified and allowed to use the initials CLSp-HT after their names. A graduate may also receive certification from the Board of Registry of the American Society of Clinical Pathologists by passing an examination given by the Registry. Individuals who pass this exam are then allowed to use the initials HT(ASCP) after their names.

## Opportunities

Since physicians are making wider use of laboratory tests in the diagnosis and treatment of diseases, many new jobs should develop in the future. In addition, population growth, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services and affecting the growth of jobs in this field. Qualified histologic technicians can advance to supervisory positions or, after further education and special training, move into research or teaching activities. The level to which a technician rises, of course, is governed by experience, skill development, and completion of advanced education courses.

DOT Code: Tissue Technologists 078.361-030

For further information, contact:
American Medical Technologists
American Society of Clinical Pathologists
The American Society for Medical Technology

# Medical Laboratory Technician

Medical laboratory technicians are mid-level laboratory workers who function under the supervision of a medical technologist or laboratory supervisor. They perform a wide range of tests and laboratory procedures which are more complex than the routine duties assigned to laboratory assistants but which do not require the technical knowledge and management skills of highly trained medical technologists.

Medical laboratory technicians are qualified by education and experience to perform clinical laboratory testing which requires minimal exercise of independent judgment. Working under appropriate supervision, they perform a number of laboratory tests in chemistry, hematology, urinalysis, blood banking, serology, and microbiology. These test results are used to develop the information needed by physicians in determining the presence, cause, and extent of diseases in patients. As part of their work, medical technicians often use laboratory instruments ranging from microscopes to highly computerized instruments such as the automated blood analyzers which analyze blood and body fluids for chemical constituents such as cholesterol, sugar level, and hemoglobin content.

Most medical laboratory technicians work in hospitals, while others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. Medical laboratory technicians generally work a 40-hour week, and in hospitals some night and weekend duty can be expected. Technicians usually work closely with medical technologists, pathologists, laboratory assistants, and other medical personnel. Laboratories generally are well-lighted and clean. Although unpleasant odors and specimens of many kinds of diseased tissue often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

## Job Requirements

Accuracy, dependability, the ability to follow directions, and the ability to work under pressure are important personal characteristics for a laboratory technician. In addition, manual dexterity and normal color vision are highly desirable. Preparation for a career as a medical laboratory technician requires a high school education followed by an associate degree from an accredited junior or community college and then clinical experience in an approved laboratory. The AMA's Committee on Allied Health, Education and

Accreditation approves programs for the medical laboratory technician. After completing the course work in clinical education, the graduate can receive certification from several different agencies. The National Certifying Agency for Medical Laboratory Personnel administers an examination for the clinical laboratory technician. The individuals who pass this examination are certified and allowed to use the initials CLT after their name. Graduates may also receive certification from the Board of Registry of the American Society of Clinical Pathologists by passing an examination given by the Registry. Individuals who pass this examination are then allowed to use the initials MLT(ASCP) after their names. They may also receive registration with the American Medical Technologists. This registration can be acquired by high school graduates who have completed a 2-year school program approved by the Accrediting Bureau of Medical Laboratory Schools. The American Medical Technologists will also register medical laboratory technician students who have completed a 50-week Armed Forces course in medical laboratory techniques together with approved laboratory experience.

Medical laboratory technicians are licensed in the following States: Alabama, Florida, Georgia, Hawaii, Illinois, Nevada, Pennsylvania, Tennessee, New York (New York City only), and Puerto Rico. The appropriate State agency should be contacted for exact licensing requirements.

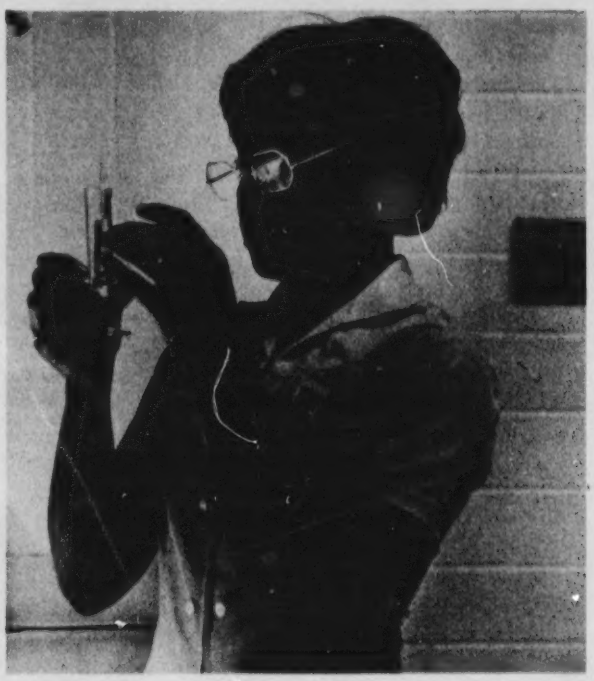
## Opportunities

Hospitals and other facilities are expected to continue to need competently trained medical laboratory technicians to meet increased demands for laboratory services and to free medical technologists and other laboratory staff for the more complex, highly technical procedures and supervisory duties.

Employment of laboratory technicians is expected to expand faster than the average for all occupations through the mid-1980's, as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of diseases. Also affecting the growth in the field are population increase, greater public health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services. The number of persons seeking to enter the field of medical laboratory technician is expected to exceed the number of openings resulting from growth and replacement needs. Consequently, persons seeking jobs in this field may face competition for positions of their choice. A medical laboratory technician may advance to medical technologist or a supervisory position by acquiring the necessary education and experience. The technician position provides a new intermediate level on the laboratory career ladder thus opening the way for individuals to move more easily to higher levels. Colleges are being encouraged to provide for the upward mobility of students who are seeking to insure transferability of credits earned toward their B.S. degrees.

DOT Code: Medical Laboratory Technician 078.381-014

For further information, contact:
American Medical Technologists
The American Society for Medical Technology
American Society of Clinical Pathologists



## Medical Technologist

Medical technologists are highly skilled generalist laboratory scientists who perform chemical, microscopic, microbiological, hematological, serological, and radiobioassay tests which require the exercise of independent judgment and responsibility in the diagnosis and treatment of diseases. They must be able to relate the results of the laboratory tests to the normal healthy state and to the presence of diseases or other conditions which may alter test results. Medical technologists assure the validity of test results by using statistical measures of precision and accuracy and other methods of quality control. The medical technologist may also introduce methods and new equipment into the laboratory.

Medical technologists identify, count, and note any irregularities in the size, shape, and other characteristics of red and white blood cells and compare the results with previous tests using microscopes and modern electronic equipment. They also test blood for over 200 chemical substances including the sugar content, hemoglobin content, cholesterol level, and the presence of other substances which are altered in diseases such as hemophilia, anemia, leukemia, heart condition, and mononucleosis. Technologists examine urine for its acid, sugar, and protein content, and use microscopes to detect evidence of blood cells and other foreign substances which could indicate the presence of such diseases as diabetes, nephritis, or bladder cancer. Medical technologists also collect blood from donors, type the blood, and cross match it for compatibility with the blood of patients who need tranfusions. They grow cultures of bacteria and fungi from patients' blood, sputum, feces, or discharge from a sore or wound; identify the organism; and determine which antibiotics are most effective in each case. Technologists perform other tests to search for and identify parasites living in the patient's body and determine what antibodies and other disease-fighting elements are present in the patient's blood.

Technologists are trained to operate special apparatus and a wide array of precision instruments—electronic cell counters, automatic chemical analyzers, chromatographs, centrifuges, microscopes, and computers. They also operate complex electronic equipment to measure the amount and location of radioactivity in the analysis of hormones and other substances. Some medical technologists perform all of the tasks described while others specialize in one particular area. For example, clinical chemistry technologists are those who specialize in determining the presence and quantity of chemical substances in the blood and other body fluids. Hematology technologists concentrate their efforts on performing tests for clotting factors and studying slides of blood cells to facilitate the diagnosis of illnesses. Another example of specialization in this work is the microbiology technologist. These specialists are concerned primarily with growing, isolating, and identifying the bacteria, fungi, and other organisms present in the human body. Some technologists, especially those in larger hospitals or clinics, also teach medical technology students, laboratory assistants, medical students, and pathology residents. Most administrative and supervisory duties in the laboratory are performed by medical technologists.

About two-thirds of all medical technologists work in hospital laboratories. Other employers are clinics; physicians in private practice; pharmaceutical, reagent, and instrument manufacturers; insurance companies; medical, dental, and veterinary colleges; city, State and Federal health agencies; and research organizations for cancer, tuberculosis, and other diseases. In general, medical technologists work five 8-hour days a week. Those employed by hospitals, where emergency duty is often required, may be on call for evening duties. Others may work the night shift or have weekend work as part of their regular schedule. Clinical laboratories, particularly in hospitals, are open 24 hours a day, 7 days a week. While medical technology does present the occupational hazard of infection from bacteria or viruses, such illness rarely occurs.

### Job Requirements

Persons considering a career in medical technology should have an aptitude for chemistry, physics, and biology; should like working in a laboratory; and have the ability to do careful, reliable work under pressure. Medical technologists should be skilled at using their hands, since they work with small instruments and delicate equipment. Communication and human relation skills are also important since they help them to function as supervisors and educators.

Other assets are good health, normal vision, and an ability to distinguish fine shades of color. Some materials handled by technologists might seem unpleasant to those who lack scientific interests in education, but medical technologists cannot afford to be unduly squeamish.

The education requirements for certification as a medical technologist include 3 years of college plus 1 year of clinical education in a school of medical technology approved by the Committee on Allied

Health Education and Accreditation of the American Medical Association. Educational requirements are designed to result in a bachelor's degree.

The preprofessional part of the college program includes a minimum of 16 semester hours each in approved chemistry and biological science courses. Also a minimum of one semester of college-level mathematics and basic microbiology. Some programs also require physics, genetics, medical chemistry, and computer technology.

At the end of 3 years (or 90 semester hours), students are ready to begin the clinical-education phase in one of the approved schools of medical-technology located in hospitals or university health and medical centers. Some universities with a School of Allied Health Professions of a school of Allied Health Sciences integrate the entire 4-year curriculum to provide clinical laboratory experience simultaneously with basic science courses. Most medical technology programs accept a limited number of students (15 or less); therefore, application for admissions should be made at the end of the fifth semester of college. A few of the hospital schools require a college degree before admission.

After completing college work and the clinical education in an approved school of medical technology, the graduate can receive certification from several different agencies. The National Certifying Agency for Medical Laboratory Personnel administers an examination for clinical laboratory scientists. Individuals who pass this examination are certified and allowed to use the initials CLS after their names. The graduate may also receive certification from the Board of Registry of the American Society of Clinical Pathologists by passing an examination given by the Registry. Individuals who pass this examination are then allowed to use the initials MT(ASCP) after their names. Specialty examinations are also given by both agencies in chemistry, microbiology, hematology, and blood banking, so that a technologist is eligible for these occupational areas after special additional instruction or experiences are obtained in the particular field. The American Medical Technologists (AMT) grants registration and certification to those who have completed 90 semester hours in an accredited college with specific course requirements, have completed 1 year of laboratory experience, and have passed their certification examinations. American Medical Technologists have developed a career ladder to enable technicians qualified to apply for the medical technologists certification examination after completion of 3 years of approved laboratory experience. AMT-registered medical technologists use the designation MT after their names.

## Opportunities

Medical technology has experienced one of the fastest growth rates in the health field in the past decade. Employment prospects are expected to continue to be good during the next decade because of the greater number of people who require laboratory tests every day, increased dependence on laboratory tests for routine care as well as diagnosis and treatment, and the broadening coverage of government-sponsored and private health insurance plans.

Opportunities for advancement in this field are good for qualified medical technologists. Promotions are usually based on experience, work expertise, and knowledge obtained through acquisition of master's degrees, advanced education courses, and seminars and workshops sponsored by various professional societies.

| DOT Code: | | |
|---|---|---|
| | Medical Technologist | 078.361-014 |
| | Hematology Technologist | 078.361-014 |
| | Microbiology Technologist | 078.261-014 |
| | Medical Technologist, Chief | 078.161-010 |

For further information, contact:
The American Society for Medical Technology
American Medical Technologists
American Society of Clinical Pathologists

NIH Div. Research Resources

## Specialist in Blood Bank Technology

Specialists in blood bank (SBB) technology perform routine and specialized tests in blood bank immunohematology. They develop their skills and expertise through advanced training in such areas as donor selecting; drawing blood; blood typing, preparing, and storing; compatibility and antibody studies; transfusion reactions; investigation of hemolytic diseases of the newborn, and quality control. Some specialists in blood bank technology concentrate their efforts in one particular area such as research associated with a laboratory, university, or government-related facility. Specialists in blood banking sometimes work as supervisors, educators, technical consultants and function as part of the health team, providing essential health services to patients.

Specialists in blood bank technology work in many types of facilities including community blood centers, private hospital blood banks, university affiliated blood banks, independent laboratories, Red Cross blood centers and may also be part of a university faculty. Specialists work as an integral part of the laboratory and health-care team in providing direct support for patient care. This work may require some weekend and night duty, including emergency calls. Generally, there are no specific physical requirements for successful job performance except good health and good psychomotor skills.

### Job Requirements

Individuals considering this career must complete a 1-year education program in blood bank technology which is accredited by the American Medical Association (AMA), Committee on Allied Health Education and Accreditation (CAHEA), and the Committee on Education of the American Association of Blood Banks (AABB). In order to qualify for admission to an accredited education program, candidates must be either certified as medical technologist, MT(ASCP), or have a bachelor's degree in a biological or physical science, plus at least 1 year of acceptable clinical laboratory experience.

Most SBB education programs are conducted in hospital or community blood banks and consist of classroom activities combined with practical work in the blood bank.

The American Association of Blood Banks (AABB) and the American Society of Clinical Pathologists (ASCP) administer a certification examination for those who qualify. Individuals who pass the certification examination are permitted to use the designation SBB(ASCP) after their names. The National Certifying Agency for Medical Laboratory Personnel will administer an examination for specialists in blood bank technology, and the individual who passes this examination will be granted the designation CLSp-BB.

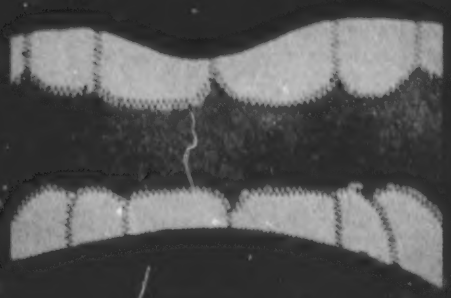
### Opportunities

The employment outlook for specialists in blood bank technology is favorable, and currently the demand exceeds the supply. Qualified specialists may advance to supervisory or administrative positions, or move into teaching or research activities. The criteria for advancement in this field are experience, technical expertise, and completion of advanced education courses.

DOT Code: Blood Bank Technologist 078.361-014

For further information, contact:
American Association of Blood Banks
American Society for Medical Technology
American Society of Clinical Pathologists

# Dentistry



Dentistry, as a branch of the health profession, emphasizes not only treatment but also prevention of problems associated with the hard and soft tissues of the mouth. Dentists and other trained personnel work in cooperation with physicians, school health services, nursing homes, and health-maintenance organizations to safeguard public health. Education of the public in good oral hygiene and nutrition contributes to the prevention and cure of oral-health problems.

As standards of living and education have risen along with the availability of prepaid dental plans, the demand for dental care has also risen. Dentistry, both in general and specialty practice, is a field offering lifetime opportunity for well-qualified, professional people.

The dental profession has tried to increase availability of services with the use of a large number of trained personnel. The trend is also toward the expansion of the role of dental auxiliaries (dental hygienists and dental assistants) by delegating to them specific tasks requiring greater skill and responsibility, in order to increase the dentist's productive capacity. These tasks, classified as "expanded functions," vary from State to State, but in all instances are performed under the dentist's supervision.

## Dental Assistant

Today's busy dentist, in either general or specialized practice, needs one or more dental assistants.

It is the assistant's job to greet patients, make them comfortable, and prepare them for examination, treatment, or surgery. The assistant helps chairside—arranging instruments, materials, and medication; handing them to the dentist, as requested; preparing solutions, mixing materials, keeping accurate patient-treatment records, taking and processing X-rays; and sterilizing instruments. In addition, clerical work, which involves answering telephones, receiving payment for dental services, bookkeeping, and ordering supplies, is also usually part of the job.

As a dental auxiliary, the assistant may, in addition, perform expanded functions which vary from State to State and which may include applying materials to teeth to make them more resistant to decay, making models of patients' mouths as well as the impression trays to hold the materials used for the models. Cleaning, polishing, and making uncomplicated repairs on removable partial or complete dentures are other tasks which may be delegated to the dental assistant in States where this is legal.

Dental assistants do not specialize but may be employed by dentists in any of the specialties of dentistry such as oral surgery, orthodontics (straightening of teeth), or pedodontics (care and treatment of children's teeth). They may also be employed by hospital dental services, dental schools, dental products manufacturers and suppliers, health maintenance organizations, and insurance companies. Other employers are governmental agencies or organizations engaged in dental research.

Patience, understanding, and the ability to get along well with people are necessary qualities, since the assistant must be able to make the patient feel at ease. Good eyesight and hearing and the ability to use hands and fingers skillfully are needed, as well.

### Job Requirements

American Dental Association (ADA) accredited courses for dental assistants are offered in dental schools, community colleges, vocational-technical schools, and privately owned and managed schools. Depending upon the curriculum, a program can be from 9 months to 2 years in length and lead to a certificate or associate degree in applied science. Admission requirements vary from school to school but generally will include a high school diploma, above average grades in science and English, a high school average of C or better, and a personal interview. Some programs require applicants to take a college entrance examination; for example, the School and College Ability Test (SCAT), the American College Test (ACT) and/or the Dental Assisting Aptitude Test (DAAT). The DAAT is administered by the Certifying Board of the American Dental Assistants Association.

Certification is optional and not usually a requirement for employment, although it may occasionally result in higher wages. Continuing education is also optional but is required in order to maintain current certification.

Eligibility for certification is based upon graduation from an A.D.A. accredited program, and certification is issued by the Certifying Board of the American Dental Assistants Association.

Two States—Minnesota and California—currently have registration for performance of expanded functions and are both governed by their State board of dentistry. Qualifications vary and their relationship to employment would vary depending on the type of dental practice.

### Opportunities

Dental assistants may advance to dental assisting educator by completing college-level courses leading to a baccalaureate degree.

Currently, the job outlook for dental assistants is excellent. As more and more dentists make use of expanded functions which these dental auxiliaries may now perform, the need for dental assistants will continue. Greater use of prepaid dental care plans by many persons will also increase the need for these workers.

DOT Code: Dental Assistant 079.371-010

For further information, contact:
American Dental Assistants Association

## Dental Hygienist

#### Registered dental hygienist

The majority of dental hygienists are employed in dental office practice; others are employed in public schools, State and local health clinics, hospitals, industry, and voluntary health agencies. Duties vary according to the type of employment.

The hygienist, working in private practice under the dentist's direction, removes scale from teeth; applies materials to make teeth more resistant to decay; takes X-rays; and performs various laboratory tests, as well as other patient services related to health care of the mouth. Professional instruction in selection and use of toothbrushes and other devices, as well as instruction to patients about the relationship between diet and oral health, are also part of the job.

The practice of dental hygiene is governed by State laws and in some areas, hygienists may now perform expanded functions to aid the dentist. Administering local anesthetics, performing curettage (scraping under gums), placing dressings on open wounds after gum surgery, and placement and removal of temporary tooth restorations constitute some of these duties.

When working in a school system, dental hygienists provide dental health education to students and teachers. They may also provide counseling, instruct students on proper dental care, and plan programs on oral hygiene, as well as other duties.

When employed in the area of community dental health, hygienists assist dentists in determining the need for dental care and identifying resources for dental care. They may also develop and conduct organized dental-health-education programs designed to meet the needs of the community.

Some hygienists are engaged in dental research projects. Responsibilities can include interpreting data, writing reports on all studies, and preparing and presenting papers and publications on the research conducted.

Advanced training provides opportunities for teaching and/or administrative responsibilities in a dental-hygiene educational program. As a faculty member, the dental hygienist may teach a particular part of the curriculum which includes patient education, sciences, office practice, clinical techniques, and services to the community.

Dental hygienists also serve as consultants in an advisory capacity for State public health offices. Here, they provide in-service training for dental hygienists in local health departments; work cooperatively with other public health personnel, schools, and civic groups; and assist in field training for graduate dental hygiene students in public health. Responsibilities may also include the collection, development, and evaluation of dental-health-education materials as well as other duties.

Some hygienists work in nursing or convalescent homes or hospitals where they may act as consultants in developing dental-care procedures. They are primarily concerned with the special oral health problems of patients who are very ill, bedridden, and physically or mentally handicapped.

Although there are no recognized specialties in dental hygiene, many dental hygienists work in specialty areas, such as periodontics (treatment of tissues supporting the teeth), orthodontics (straightening of teeth), and pedodontics (care and treatment of children's teeth).

## Job Requirements

Before entering practice in the field of dental hygiene, graduation from an accredited program and a license to practice are required. A high school diploma with a college preparatory course is basic to entry into such a program.

Two-year dental hygiene programs are offered by many community colleges, technical institutes, some 4-year colleges and universities, as well as schools of dentistry. Most will accept students for the 2-year program directly after their graduation from high school. On completing the 2-year program, the graduate receives a certificate or an associate degree. This type of degree prepares the graduate for office practice, work in a clinic, and work on some local public health projects.

There is an increasing emphasis on college-level work before entering a dental hygiene program. This is particularly true in 4-year colleges and universities and programs affiliated with dental schools, even though students are not working toward a bachelor's degree. Some junior colleges recommend previous work, usually in the sciences, before enrollment in the dental hygiene curriculum.

Prior to entering college, applicants take one or more of the standard college entrance examinations, and some schools recommend or require the Dental Hygiene Aptitude Test (DHAT) as well. The DHAT is designed to measure skills and knowledge in the biological, physical, chemical, and social sciences and the ability to read, analyze, and remember new information.

Other requirements may include physical and dental examinations and personal interviews. State and community-supported colleges usually give preference to residents of the State or area.

Post-certificate bachelor's degrees are offered by a number of 4-year colleges and universities. These programs allow the hygienist who has completed a 2-year program to acquire clinical experience as well as to earn a bachelor of science degree with only 2 additional years of academic work. Usually, hygienists in these programs are preparing for a teaching career.

Some dental schools also offer bachelor of science degrees requiring 4 years of college work. In addition to office practice, graduates are prepared for positions requiring some supervisory and administrative responsibilities in health departments, hospitals, and educational institutions.

Graduate work leading to a master's degree in dental hygiene or a related field of public health is offered in several schools. Programs are designed for dental hygientists interested in teaching or administrative positions.

All States require a license to practice dental hygiene. A license is obtained by successfully completing both clinical and written examinations. Most States accept the National Board Dental Hygiene Examination at all accredited dental hygiene programs instead of the State written examination.

Clinical or practical examinations are given at least once a year by all State boards of dentistry and by several regional testing agencies. The dental hygiene license is issued by the State. Information, specific requirements, and testing dates can be obtained from individual State boards of dentistry or the Council on the National Boards of Dental Examiners of the American Dental Association.

Continuing education courses are available in some States for hygienists who want to keep up with the latest techniques and materials. They may be regularly scheduled evening classes in local schools or "refresher" courses running from a few days to several weeks and sponsored by professional associations or educational institutions.

In several States, continuing education is required to maintain licensure.

When licensed, the dental hygienist is ready to start working. The average week runs 35 to 40 hours with an occasional Saturday or evening included in the schedule.

The work itself involves contact with patients, patients' families, dentists, and other members of the oral health care team. In private practice, a considerable amount of time is spent working next to the patient in the dental chair. Physical stamina, good eyesight, and manual skills are important to success.

## Opportunities

The overall employment outlook for dental hygienists is excellent due, in part, to growth of dental prepayment plans and also to increasing public demand for oral-health care. Opportunities are also good for hygienists willing to work in areas which do not have enough dental services and for those seeking part-time employment, as well as for dental hygiene health educators who benefit from increases in the number of health-education programs.

Advancement in this field is usually dependent upon additional education. Graduates of 2- or 3-year certificate or associate degree programs are generally limited to dental office practice and some public health positions. However, these graduates may decide to continue their education to the baccalaureate or master's degree level. Hygienists with baccalaureate degrees may work in a private practice and, with office experience, are eligible for positions requiring some supervisory and administrative responsibilities in health departments, hospitals, and educational institutions. Education to the master's level prepares the dental hygienist for advanced positions in teaching, administration, and public health.

DOT Code Dental Hygienist 078.361-010

For further information, contact:
American Dental Hygienists Association

# Dental Laboratory Technician

Dental laboratory technicians make and repair orthodontic-tooth straightening devices, dental restorations, such as full or partial dentures, inlays, and crowns, using plastics, ceramics, and metals. The technician, a skilled craftsworker, produces dental appliances under the direction, or according to the prescription, of a licensed dentist by means of a procedure which must be performed with painstaking accuracy in order to insure perfect fit in the patient's mouth. An impression of the tooth or teeth is taken in the dentist's office and sent to the dental technician along with the prescription or work order. (To make full or partial dentures, the technician uses wax and plaster models, electric grinders and polishers, as well as instruments to hold models or casts so teeth can be arranged properly or to check casts for fit of the clasps which will hold partial dentures in the patient's mouth.) Bending, soldering, and casting are necessary techniques.

Dental laboratories, which are usually small, privately owned businesses located mostly in large cities, employ the majority of technicians, although some technicians work in dentists' offices and a small number are employed by the Federal Government.

The work of the technician is not strenuous. Though there may be some pressure to meet time schedules, the dental laboratory is usually quiet and calm.

Good vision, ability to recognize very fine color shadings, finger and manual dexterity to work with delicate tools and materials are essential attributes which must be combined with the ability to follow instructions and work with absolute accuracy.

There are five areas of specialization available to dental technicians: complete dentures, partial dentures, crown and bridge, ceramics, and orthodontics. Ceramics is concerned with creating crowns of porcelain by building up layers of mineral powders which are then fused in an oven. Orthodontic devices require laying out designs of metal frameworks and clasps or constructing and repairing appliances used to straighten teeth.

## Job Requirements

The single educational requirement for most jobs as dental technician is a high school diploma. These courses are particularly helpful—chemistry, physiology, art, ceramics, mechanical drawing, and shopwork. If possible, the student should acquire basic knowledge of the chemistry of plastics and simple metallurgy.

Many dental technicians learn the craft by on-the-job training lasting 3 to 4 years in a dental laboratory. Another way to prepare for this career is to enroll in an

approved training program offered by an accredited school. There are about 30 dental laboratory training programs in various schools throughout the country offering academic courses and laboratory instruction. These are 2-year programs leading to an associate degree in applied science.

Some technicians acquire their training in the armed services.

Certification exists for applicants who successfully complete the certified dental technician program examination after meeting the following qualifications: 5 years of experience in the field (time spent in an approved supervised training in a dental laboratory school may be substituted for part of this experience). For example, if a candidate is a graduate of an accredited 2-year school of dental laboratory technology, the 2 years plus 3 years of actual experience would qualify the individual to take the examination. Certified technicians are required to renew certification each year. They must meet continuing education requirements set by the National Board for Certification, National Association of Certified Dental Laboratories. The basic written examination covers history, law, and ethics. A second examination is concerned with 1 of the 5 laboratory specialties. Candidates then must pass a practical examination in the specialty or specialties for which they seek certification.

## Opportunities

Although a career in dental laboratory technology may begin with on-the-job training in a commercial dental laboratory, additional education in an accredited school program leading to an associate degree is desirable. Dental technicians, depending upon their skill, experience, and education, may advance to managerial positions. Most of today's commercial dental laboratory owners came up "from the bench" to own their own business.

There are many factors which point to a greatly increased demand for dental technicians. First is the growth in the national population and the increasing numbers of older age groups which frequently require comprehensive dental health care. Second, there is a rising level of personal income and a growing public awareness of the importance of preventive dentistry. Third, it is estimated that a large number of Americans will be covered by dental prepayment insurance plans in the next 10 years.

| DOT Code | | |
|---|---|---|
| | Dental Laboratory Technician | 712.381-018 |

For further information, contact: National Association of Dental Laboratories

# Dentist

**Dental surgeon**
**Doctor of dental medicine**
**Doctor of dental surgery**

The majority of dentists are self-employed, work in their own offices in general practice, and provide a wide range of general care. This includes treating problems associated with the gums and teeth and also trying to prevent their occurrence or reccurrence. Their duties also include locating and filling cavities, straightening crooked teeth, performing extractions, treating gum and mouth diseases, as well as providing artifical teeth when necessary. The patient's general health is also of concern to the dentist. Symptoms may be detected which call for a physical checkup and require the dentist to work closely with the family doctor to correct the trouble. Cooperation with school nurses and health departments in prevention programs is often also involved.

Instead of entering private practice, a dentist may choose to take a salaried position. For those who do, there are opportunities in industry, hospitals, any branch of the armed forces, the Veterans Administration, public health facilities, dental research, health-maintenance organizations, and nursing homes.

Dentists can also find teaching opportunities in dental schools, and those interested in research will want to become associated with a teaching center. Teaching and research are often combined on a part-time basis with either private or salaried practice.

Although most dentists provide a wide range of general care, many take additional professional training in a specialty and then limit practice to that area of dentistry. In order to become a diplomate of a specialty board, the candidate must have at least 2 years of advanced training (3 years for oral surgery), meet certain other specific requirements, and pass a comprehensive examination given by the nationally recognized examining board assigned to the chosen specialty.

There are eight recognized dental specialties, and each specialty is concerned with a different aspect of oral health care. They are as follows:

The endodontist diagnoses and treats problems affecting teeth roots.

An oral pathologist examines specimens form patients' mouths, using a microscope and other laboratory equipment to diagnose tumors and other abnormal changes, both in the mouth and nearby areas.

Oral surgeons perform surgery on the mouth and jaws. Difficult extractions; removal of tumors; and

surgical treatment of diseases, injuries, and defects in the oral region are some of the procedures involved in this specialty.

Orthodontists prevent, diagnose, and correct poor positioning of teeth and related structures.

Pedodontists treat childrens' teeth from birth through adolescence.

Periodontists treat tissues supporting and surrounding the teeth.

Prosthodontists restore patients' natural teeth and replace missing teeth with artificial substitutes so as to improve appearance, mastication, and speech.

Public health dentists are involved in preventing and controlling dental diseases and promoting good dental health in a community through planning, organizing, and maintaining the dental-health program of a public health agency.

## Job Requirements

A career in dentistry requires early planning on the part of the student interested in this field. After graduation from high school, 6 to 7 years of school are required to complete the training necessary to become a D.M.D. (Doctor of Dental Medicine) or D.D.S. (Doctor of Dental Surgery)—equal titles.

While all dental schools are on a 4-year academic program, the college curriculum may vary from 3 to 4 years. Applicants must have a minimum of 2 years at an approved liberal arts college. Many schools require 3 or 4 years of study. Currently, the majority of students have completed 4 years of preprofessional education prior to enrollment in dental schools. Preprofessional (predental) education should emphasize courses in English, physics, inorganic and organic chemistry, as well as various biological sciences.

In recent years, dental schools have shown an increasing willingness to waive traditional prerequisites in order to admit students of high potential ability. As a result, the entire admissions scene is a changing one, and individual schools must be consulted for current requirements. Nevertheless, applicants should be aware of the stiff competition for admission to dental school. The prerequisites for dentistry are better than average grades, especially in the sciences, good eyesight, and skillful hands. Since dentists work closely with patients who are often in pain and under stresss, good health and a genuine liking for people are also necessary. Dental schools also look for a high degree of motivation and good scores on the Dental Admissions Test (an examination designed to show potential for dentistry).

Prospective dental students should seek guidance from faculty members and write for advice to the admissions office of the dental school they plan to attend.

Students who have been admitted to dental school work in three broad academic areas. One area is the basic health sciences which include anatomy, biochemistry, history, microbiology, pathology, pharmacology, and physiology, each with emphasis on the special concerns of dentistry. A second area is application of the health sciences to delivery of oral health services, with emphasis on diagnosis, treatment planning, and the performance of all aspects of clinical dentistry. Among the subjects covered are patient psychology, business management, professional ethics, community health, and the use of dental auxiliaries (dental hygienist, dental assistant, and dental technician). The basic laboratory courses were formerly concentrated in the first and second years, with the third and fourth years reserved for clinical training. There is a growing tendency today to combine theory with practice as soon as possible. Dental schools are responding by designing curriculums which focus on the student as an individual and permit each student to gain professional knowledge and proficiency in ways best suited to individual needs.

After completion of dental school, a licensing examination must be taken by all new dentists in order to be able to practice. The examination is given by the dental licensure board of the State where the person

wishes to practice. Annual registration is required by some States. A number of States have agreements recognizing licenses issued in other States. Some States may also require a practical examination.

The American Dental Association conducts the National Board of Dental Examiners. This board gives written examinations which are accepted in lieu of written State tests in all States except Delaware and Florida. All clinical and practical examinations are administered by State boards.

Dentists who plan to specialize, teach, or do research may continue their education with postgraduate courses, or may enter a hospital as dental interns or residents. There is a nationally recognized examining board for each of the dental specialties.

Those who look forward to a career in the administration of dental health programs will need to supplement dental training and basic experience with an additional year of study leading to the degree of Master of Public Health.

All dentists, whether they specialize or not, are strongly encouraged to continue their education annually through special courses which are offered at hospitals, dental schools, and other places throughout the country. Continuing education requirements vary from State to State depending upon the State law regarding licensure.

## Opportunities

Dentists starting out in private practice must face the fact that financial problems may be difficult the first few years. Office equipment may cost several thousand dollars. In the beginning, office hours will probably be long and irregular. Even when their practices are well established, many dentists work more than the customary 40-hour week. Being one's own employer means shouldering responsibility for office rent, assistants' salaries, and so on. However, private practice offers good income and other long-term satisfactions.

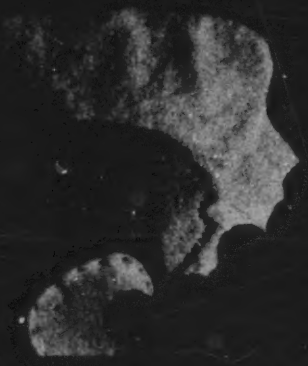
A staff post in a health agency may not offer the potential earnings of private practice but does bring economic security as well as the opportunity for promoting good dental health through community service.

Dentists advance by expansion of their practice. When employed in the education and administration fields, the dentist can advance from assistant to full professor or from assistant administrator at a public health agency to director.

The demand for dental services and the overall outlook for dentists is expected to be good despite the increased number of dental school graduates and a leveling off of population. However, areas of employment and need for specific types of dentists are changing. Rural and inner-city areas will continue to have the greatest demand for practicing dentists. As dentists, especially those in specialty practices, locate in large numbers in major urban areas, the job market in these areas will tighten. Medical advances and improvements in dental technology will lead to greater delegation of specific dental tasks to auxiliary personnel whose services extend the dentists' productive capacity.

| DOT Code: | | |
|---|---|---|
| | Dentist | 072.101-010 |
| | Endodontist | 072.101-014 |
| | Oral Pathologist | 072.061-010 |
| | Oral Surgeon | 072.101-018 |
| | Orthodontist | 072.101-022 |
| | Pedodontist | 072.101-026 |
| | Periodontist | 072.101-030 |
| | Prosthodontist | 072.101-034 |
| | Public-Health Dentist | 072.101-038 |

For further information, contact:
American Dental Association
American Association of Dental Schools
American Association of Orthodontists
National Dental Association (Professional organization of Minority Dentists)



Human nutrition is the science of food and its effect on the human body. It is concerned with the nutrients in food, their use in body chemistry and physiology, and, in the final analysis, with the wide range of relationships of foods to maintaining or restoring health.

In this field, the term "nutritionist" is a general occupational title which applies to different types of health professionals involved with food science and human nutrition. Among these professionals are the dietitian, food technologist, and home economist, and each of these careers is discussed in depth in the following pages. In addition, career information about dietetic technicians and dietetic assistants engaged in food administration and nutrition services is presented in detail in this section.

## Dietetic Assistant

**Dietetic service supervisor**
**Food-service supervisor**

Dietetic assistants work under the direction of a dietitian or dietetic technician and are responsible for supervising food services and nutrition-care services in various types of facilities. Their duties depend in large part on the size, type, and organization of the facility. Typical responsibilities in food-services activities include assisting with menu planning, production schedules, and the standardization of recipes. In addition, assistants oversee the ordering, receiving, and storing of food and supplies; supervise various dietary workers; and maintain sanitation, safety, and security practices. In health-care facilities, patient-care services involve dietetic assistants in such tasks as processing dietary orders, menus, and other related directives; helping patients with menu selection; and writing routine modified diets according to established patterns.

Dietetic assistants also instruct and train dietary workers in the use, care, and maintenance of equipment and assist in orientation, on-the-job training, and in-service educational programs for dietary personnel. Added duties include recommending improvements in facilities and equipment, suggesting changes in policies and procedures, and evaluating the work performance of subordinates.

In addition to the dietetic assistant, there are other workers who provide important supportive services in dietetics and nutrition. Two of these are the dietetic clerical worker and the dietetic worker.

In general, the dietetic clerical worker assists the dietitian with paperwork—and there is a great deal of it in a dietetics department. In addition to general secretarial and clerical duties, this also includes typing menus, purchase orders, and recipes; tallying food supplies issued to the cooks; preparing worksheets; calculating recipe and menu costs; and the many similar office tasks involved in large-scale food service. No special training is required beyond basic stenographic and clerical skills of the kind taught in a high school business course.

It takes a good-sized staff to run any large-scale food service. The number of people required and the extent to which each one specializes in just one part of the operation depend on the size of the facility or organization. But, whether the institution is large or small, the jobs that need doing cover the whole range of food preparation—storing, preparing, cooking, and serving, as well as dishwashing and kitchen cleaning. Every one of these jobs performed by the dietetic worker is an important link in maintaining high standards. Training is usually given on the job. However, courses may be taken in vocational high schools to prepare students and adults for food service employment. For employees who show interest and aptitude, classes under a dietitian may be offered in such subjects as nutrition, food preparation, storage, and sanitation. With experience, it is possible to qualify for positions of greater responsibility.

Dietetic assistants and other dietary employees work in a variety of organizations including hospitals, nursing-care facilities, schools, day- and geriatric-care centers, and in industrial food-service establishments. Assistants usually work a 40-hour week, which may involve weekends, and do considerable amounts of standing and walking during normal perforance of duties.

### Job Requirements

Career preparation includes a high school diploma or the equivalent, plus completion of an approved program in food management and dietetics leading to a dietetic assistant certificate. These programs are offered in community colleges or postsecondary technical schools and consist of academic and clinical components, including supervised field experience. Programs generally last about 1 year and are approved by the American Dietetic Association. In addition to vocational training, candidates should have supervisory potential, an interest in working with food, and the ability to work well with people.

## Opportunities

Employment opportunities for dietetic assistants and other dietary employees are quite favorable. This is due to the increasing use of trained assistants and dietary workers to meet expanded demands for dietetic and nutrition services by health facilities, educational institutions, food-service systems, and various other organizations. Dietetic assistants can advance to dietetic technician or dietitian by successfully completing additional academic and supervised clinical training.

| DOT Code: | | |
|---|---|---|
| | Food Service Supervisor | 319.137-010 |
| | Diet Clerk | 245.587-010 |

For further information, contact:
The American Dietetic Association

# Dietetic Technician

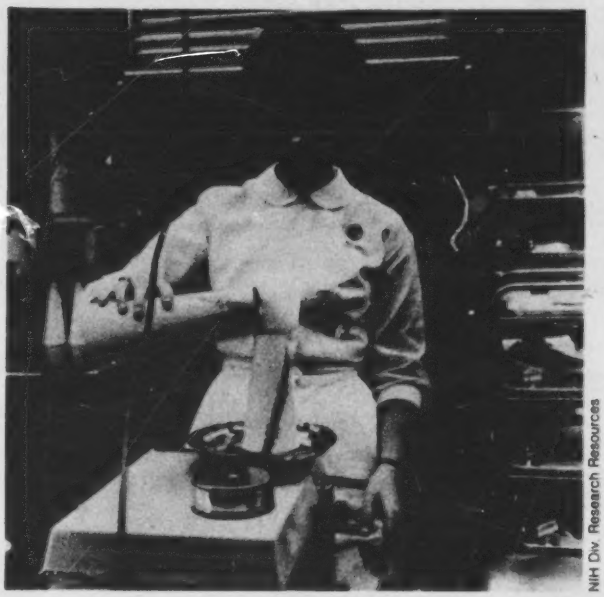
Dietetic technicians are members of the dietary staff who specialize in food administration and/or nutrition-care services. Specialists in food administration perform a variety of tasks including producing quality food, developing standardized recipes, managing cafeterias, and the training of personnel. The size and organization of the department of dietetics in the facility determines the exact nature of the technicians' duties. For example, in a large hospital dietetic technicians work under the supervision of a dietitian, while in a small hospital or related health facility they may assume responsibility for total food service under the supervision of an administrator and a consultant dietitian. Technicians in food-service management may also be responsible for budget control, employee and production scheduling, sanitation, and safety, security standards, and controls.

Technicians who specialize in nutrition-care work under the supervision of a clinical or community dietitian. Typical duties include taking diet histories, calculating routine modified diets, teaching patients normal nutritional habits, and visiting patients to evaluate their food programs. Some technicians work in community programs teaching low-income families the economics of food purchasing, preparation, and nutrition. They also direct food services, day-care centers, and assist nationals of other countries in adapting menu patterns and in purchasing and preparing nutritious foods.

Dietetic technicians are employed in a variety of organizations. These include hospitals, medical centers, nursing-care facilities, child- and geriatric-care centers, headstart programs, youth centers, schools, clinics and industrial-food-service establishments. Usually technicians work a 40-hour week, and, depending on the type of establishment, may be required to work weekends.

## Job Requirements

An individual considering this career should be a high school graduate with an appreciation of quality food, an interest in people, and the potential to develop basic management skills. The basic vocational preparation for the career of dietetic technician consists of an associate-degree program for dietetic technicians in an accredited junior or community college which combines classroom studies with practical instruction in this field under actual working conditions.



NIH Div. Research Resources

## Opportunities

There are increasing employment opportunities for dietetic technicians, due primarily to a greater emphasis on health care and nutrition throughout the country. However, technicians should be willing to look beyond local labor markets if the area nearest their training institution becomes oversupplied and there is increased competition for available openings. Dietetic technicians may advance to positions as dietitians by completing an approved undergraduate program leading to a degree in dietetics, nutrition, home economics, food science, or food-service management.

| DOT Code: | | |
|---|---|---|
| | Dietetic Technician | 077.121-010 |

For further information, contact:
The American Dietetic Association

## Dietitian

Dietitians are professionals who provide nutritional care to individuals and groups and apply the principles of management to food service systems. They promote sound nutritional practices to promote good health and to treat disease and assist in the rehabilitation of individuals through applied principles of nutrition and education. There are five major areas in dietetics—administration, clinical, education, community, and research—and within these areas are specializations.

Administrative dietitians are specialists in food service systems and are members of the management team. They apply their skills to maintain optimum efficiency in quality food production and service in providing nutritional care to individuals and groups. Administrative dietitians develop menu patterns and evaluate their acceptance. They develop specifications for the procurement of food, equipment, and supplies and establish and maintain standards for sanitation, safety, and security. Administrative dietitians are involved in all phases of personnel management including planning, conducting, and evaluating orientation and in-service educational programs. They are in demand in hospitals and other health-related facilities as well as in food service in schools, universities, industry, hotels, restaurants, and other commercial organizations.

A successful experienced administrative dietitian may become a director of a department of dietetics in a hospital-related health facility or other type of organization with a department of dietetics or nutrition. In the hospital, the director assumes the responsibility of management for all food service systems serving patients and personnel. Directors develop short- and long-range goals for the department as well as manage and control fiscal resources and budget programs. They insure that all department services are coordinated within and with other departments.

Clinical dietitians, sometimes called therapeutic, specialize in the nutritional care of patients in a hospital, clinic, or other health facility. Clinical dietitians develop and implement plans based on the nutritional assessment of patients. They confer with physicians and other members of the health team and correlate the patient's nutritional care plan with other patient care plans. They provide nutritional care for all patients and plan modified diets and supervise their service. They evaluate and followup on patients' nutritional care programs and record all necessary data on the patients' medical charts. Clinical dietitians also provide for the nutritional education of patients and families and serve as advisors on nutritional care to all members of the health-care team.

Consultant dietitians may provide advice or services in nutritional care and/or in management of food service systems in hospitals, clinics, and other health-related facilities. These experienced dietitians usually have backgrounds in clinical dietetics and in management of food service systems. They evaluate and monitor all aspects of the food service operation and make recommendations to insure the provision of nutritionally adequate quality food. Consultant dietitians may plan, organize, and conduct training programs for food service personnel, develop menu patterns, and consult with members of the health team.

Community dietitians are members of the community health team. They assess the nutritional needs of individuals and groups and develop menu patterns suited to their particular needs. These dietitians develop and implement plans of care based on an assessment of nutritional needs and other health care plans in effect. They instruct individuals and families in nutritional principles, diet food selection, preparation, and economics and adapt teaching to individual lifestyles of clients. Other community dietitians take part in evaluating dietary studies in surveys and participating in nutritional and epidemiologic studies with a nutritional component. Community dietitians work mainly in government and voluntary health agencies concerned with health and with the nutritional component of health-care services to individuals and groups.

Research dietitians participate in planning, organizing, and conducting programs in one or more of the following areas: nutrition, foods, and food service systems research. They analyze recent scientific discoveries applicable in their fields and apply them to current research. They interpret their findings to health professionals and the public and communicate through reports and publications. They may plan, conduct, and evaluate dietary studies and participate in epidemiologic studies with a nutritional component. Research dietitians may be employed in a medical center, educational institution, or commercial enterprise or may be involved in a community health program.

A specialization attracting an increasing number of experienced dietitians is that of private practice. These dietitians are self-employed and may provide nutrition

consultation to a variety of clients. Others engage in practice with physicians whose patients need nutritional guidance and some are consultant dietitians providing services to small hospitals and health-related facilities.

The majority of dietitians work in hospitals, related health facilities, and clinics. Others are employed in voluntary health agencies as well as in local, State, Federal health agencies; all branches of the military; colleges, universities, and school systems; day-care centers; industrial food service; restaurants; and research institutions.

Dietitians, particularly those in hospitals and related health facilities, work closely with people, both sick and well, of all ages and backgrounds. They have frequent contact with patients, clients, and their families, as well as other health professionals and departmental personnel. In hospital and clinical settings, dietitians may spend considerable time standing and walking. They work approximately 40 hours per week and may work occasional weekends and holidays. Contact with people physical demands, and working hours vary with specialization and type of employment.

## Job Requirements

Students considering careers in dietetics should have an interest in food and its preparation; a desire to teach and share knowledge with others; and a special aptitude for the sciences related to food. The basic educational requirement for this career is a bachelor's degree in dietetics, nutrition, home economics, food science, or food service management. An increasing number of universities offer programs which prepare graduates for beginning positions. However, most graduates enroll in a dietetic internship accredited by the American Dietetic Association (ADA). The internship lasts 6 to 12 months and provides an educational program of clinical experience (under the supervision of a registered dietitian)

plus classroom work. Several universities offer an 18-month program which combines the dietetic internship and graduate study leading to a master's degree.

The basic undergraduate programs in this field consist of studies in the physical, biological, and behavioral sciences, with emphasis on the field of human nutrition. Subject matter includes food and ecology management; time-money-human resources; statistics and data processing; chemistry of food; biochemistry and human nutrition, and human physiology; behavioral sciences and the processes of change; and the health-team approach to preventing and treating disease.

Dietitians who meet certain academic and experience requirements are eligible to join the American Dietetic Association. Membership is considered important because it provides evidence that the individual has met high qualification standards. The designation RD (registered dietitian) is given to those who meet certain academic and experience requirements and may be used by members who pass an examination and maintain a given number of hours in continuing education every 5 years.

## Opportunities

Employment prospects for qualified dietitians are expected to be favorable during the next decade. This outlook is based on anticipated increases in demand by all types of health facilities, community health programs, educational institutions, and research organizations to meet their nutrition and food-management needs.

Opportunities for advancement in this field are generally good. For example, with experience and a master's degree come opportunities for advancement to a position as director of a department of dietetics. Dietitians who are planning a career in public health must complete a graduate degree in public health nutrition in preparation for promotion.

| DOT Code | | |
|---|---|---|
| | Dietitian, Research | 077.061-010 |
| | Community Dietitian | 077.127-010 |
| | Dietitian, Clinical | 077.127-014 |
| | Dietitian, Consultant | 077.127-018 |
| | Dietitian, Teaching | 077.127-022 |
| | Dietetic Intern | 077.167-010 |

For further information, contact:
The American Dietetic Association

# Food Technologist

**Food engineer**
**Food scientist**

Food technologists play a key role in developing and processing the enormous variety of foods available today. They apply scientific and engineering skills to the production, processing, packaging, distribution, preparation, evaluation, and utilization of all types of foods. They employ their specialized knowledge to solve technological problems associated with the development of products, processes, or equipment; the selection of raw materials; the fundamental changes in the physical and chemical condition of food undergoing industrial processing; or the nutritional value of such foods and their suitability for human consumption.

Depending on where they work and the size of the organization, food technologists are involved in a variety of functions. Those who work in food manufacturing, for example, develop entirely new types of food from unusual or previously unused sources. Technologists working in processing are concerned with quality control and investigation of changes occurring in foods when they are processed and stored. Technologists employed in quality control laboratories conduct chemical tests on raw materials, food composition, and additives to assure purity, safety, and accuracy in labeling. They also use various instruments to check the physical properties of the product for such factors as product softness, color, and required warehousing conditions.

Food technologists may engage in pilot testing when a new product or process leaves the laboratory and is ready to go into full production. Using equipment and machinery patterned after those used in production, but built on a smaller scale, food technologists experiment with production techniques until they find a practical routine that can be put to use by other food technologists. This may require constructing a new plant, designing and laying out equipment and machinery, and planning the work flow. Other duties of food technologists include selecting raw materials, setting specifications for additives and ingredients, findings uses for by-product materials, supervising plant sanitation and waste controls, and studying and improving the nutritive and dietary values of food products.

About 75 percent of all food technologists are employed by food manufacturers and food processing plants, while the other 25 percent work in Government,

NIH Div. Research Resources

education, and research. In Government, technologists may be employed by regulatory agencies, such as the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and their counterparts at the local and State levels. Other Government departments using food technologists include the Department of Defense, Department of Commerce, Department of Agriculture, and the State Department. At the international level, technologists are employed by the Food and Agricultural Organization (WHO) of the United Nations. In the field of education, food technologists engage in teaching and/or research in major colleges, universities, and educational and health foundations. They also teach in community and junior colleges offering 2-year associate degree programs for food technicians. Some food technologists choose to work in sales and marketing, selling equipment or ingredients tailored to a food processor's needs, while others enter the related fields of advertising, technical editing, publishing, patent law, and private consulting.

Working conditions in food technology depend in large part on the type of organization. For example, technologists in industrial quality control and research and development laboratories work in well-equipped, clean, air-conditioned environments. However, when their work takes them from the laboratory to other areas of the industrial plant, they are subject to the hazards of occasional food spills and wet floors. Most industrial plants, including food manfacturing and processing plants, have noisy operating machinery and equipment.

Regardless of where these specialists are employed, the health forces of the Nation look to food technologists to safeguard our food and to help develop more healthful, varied, and abundant foods for more and more people.

## Job Requirements

A bachelor's degree in food science or in a related science such as chemistry, biochemistry, microbiology, bacteriology, or in food engineering is the minimum educational requirement for entrance into this field. The kinds of training available in this field vary widely, and persons considering this career area should gather as much information as possible from the approximately 60 schools offering programs in this specialty. Some colleges, for example, do not have a separate department of food technology while others offer programs leading to a bachelor's degree but no further. A few may have only a graduate program leading to a master's or a doctor's degree.

Whatever college is selected, the first 2 years should include courses in such basic science subjects as chemistry, bacteriology, physics, nutrition, biology, and mathematics. In fact, the whole program should give a thorough understanding of the fundamentals of science, engineering, and agriculture, together with their application to the manufacturing and processing of foods. A master's or doctoral degree is highly desirable for many careers in industry, and it is a necessity for careers in teaching or research.

There are no licensure or certification requirements for this work. However, membership in the Institute of Food Technologists is available to all individuals in the field with a B.S. or advanced degree in food technology of food science (or a related field), and those with 5 years of professional experience may achieve Professional Member status.

## Opportunities

Employment opportunities for food technologists are expected to grow during the next decade. The food industry is one of the largest and most stable industries in the United States, and the demand for new, quality foods which are easy to prepare, package, store, and distribute is steadily increasing. In addition, the skills of the food technologist are needed in research and development activities dealing with such problems as feeding the poor in underdeveloped countries and creating special foods for use in space and underwater programs.

A career in food technology is challenging from a scientific viewpoint, and, although beginning jobs may be routine, the advancement opportunities for qualified workers are excellent. A technologist often begins as a food chemist in the research and development laboratory of an industrial plant and, after gaining added experience and education, is able to advance to such positions as senior technologist, group leader, assistant research director, or research director. Some technologists start work in the production department of a food company and, when qualified, move into management positions such as production or quality control supervisor, section or division chief, assistant director or manager of quality control, or plant manager. Technologists with advanced degrees often begin their careers in teaching or research activities and advance through the traditional methods employed by most educational institutions. Frequently, food technologists with interests in business enter fields such as sales or marketing and ultimately may qualify for high-level management positions. In general, food technologists with advanced degrees in food science have greater employment opportunities than those at the bachelor's degree level, or those with degrees in related fields such as chemistry or microbiology.

| DOT Code: | | |
|---|---|---|
| | Food Technologist | 041.081-010 |
| | Biologist | 041.061-030 |
| | Chemist | 022.061-010 |
| | Food Chemist | 022.061-014 |

For further information, contact:
Institute of Food Technologists

## Home Economist

Home economists develop, interpret, and apply a broad knowledge of homemaking principles to promote the health and welfare of individuals and families. They focus on family functions and the effect of economic, social, cultural, and psychological forces on the family and its members. In doing so, they use knowledge not only from their own field but also from the biological, physical, and social sciences as well as the arts. Some home economists are specialists in areas such as food and nutrition, family economics, home management, child development, and family relations, while others are generalists.

Home economists in the health field perform vital functions in dealing with a variety of family-related problems. Their broad responsibilities include providing individuals and families with advice on family economics, home management, and consumer education. Specifically, home economists teach improved homemaking practices to homemakers and young people through educational programs, demonstrations, discussions, and home visits. They provide families with help in preparing budgets as well as advice

on managing time and other resources. Home economists also work with mentally retarded individuals to help them develop home-management and child-care abilities. They engage in research in government agencies, colleges, and universities to gather new data on family relations or child development, or to discover facts on food or nutrition.

There are many opportunities for the home economist in rehabilitation. The woman who is recovering from a heart attack or tuberculosis, for example, may not be able to climb stairs or do the other activities that were previously routine. Similarly, persons who are confined to wheelchairs and can no longer use their hands skillfully, or are limited to one hand, will find it impossible to manage in the same old way. Either new ways must be learned to carry out these everyday activities or someone else must take them over.

Men, too, need the help of the home economist in home management, family finance, nutrition, and other home-related areas. For men who live alone, learning to manage for one's self around the house can be an important element in convalescence or in adjusting to a permanent disability. There are men who have disabilities which make it impossible for them to be employed outside the home. If they could assume housekeeping responsibilities, it would release other family members for outside employment.

In addition, many older people enfeebled by age might continue to live independently in their homes for many years if they could be helped to simplify their homemaking and make it less strenuous.

Handicapped children and young people who have been retrained in homemaking could assume an active role in the family, reducing the burden of the parents.

The duties of the home economist in rehabilitation vary, but they can be classified into two categories: direct counseling of the handicapped individual and indirect counseling as a resource person for the rehabilitation team.

The home economist in rehabilitation may offer many different types of help:

- Suggest work plans and management practices to save time and energy.
- Plan kitchen arrangements to make the work easier.
- Assist a patient with a physical handicap (such as blindness or loss of a limb) to perform household duties in a way which will get around the handicap.
- Help patients with difficulty in body control and coordination to develop correct postures and positions.

In the rehabilitation movement as a whole, there is a growing demand for specialists with home economics background and training in occupational therapy to serve as resource persons for the rehabilitation team.

On a full-time basis, specialists often assist with staff training programs, provide service materials, and contribute to research. Acting as a resource consultant, the home economist in rehabilitation provides the rehabilitation team with answers to problems of management, with special emphasis on such areas as work simplification, nutrition and food preparation, adaptations of clothing, child care, family relations, furnishings, and interior design.

Home economists are employed by rehabilitation centers; hospitals; convalescent centers; Federal, State and local agencies; the Cooperative Extension Service; secondary schools; colleges; universities; research laboratories; private business firms; and social welfare agencies. They generally work 40 hours per week, and the physical demands and working conditions vary according to the type of establishment in which they are employed.

## Job Requirements

A bachelor's degree in home economics is the basic educational requirement for entry into this field. While in high school, students considering this career are urged to take courses in speech, English, home economics, health, mathematics, chemistry, and social sciences in preparation for college work. Individuals planning a career in this field should have good communication skills and be able to work effectively with individuals from different cultures and income levels.

The background required for home economists in rehabilitation is more extensive. The primary educational requisite for a home economist in rehabilitation is a 4-year college education with emphasis in one or more of these areas: home economics, occupational therapy, or social work. A qualified home economist in rehabilitation should have graduate or in-service training in the special education of the orthopedically handicapped, blind, deaf, cardiac, retarded, or mentally ill. If planning to work in a hospital, the consultant should have some hospital in-service training and orientation.

Prior professional work experience may include one of the following: occupational therapy, physical therapy, dietetics or nutrition, hospital or public health nursing, social work, or home economics.

Practical experience in homemaking and child care is

extremely important. The consultant should have a clear picture of what it means to do all the work of a normal household.

Personal qualifications are also very important. The home economist in rehabilitation should have a special interest and aptitude for working with handicapped men, women, and children and be able to inspire their confidence. The consultant should be able to work with people of varying educational and social backgrounds. In addition, the consultant should be flexible and imaginative in any approach to homemaking problems.

There are no licensing or certification requirements for this work, but qualified home economists often become members of the American Home Economics Association.

## Opportunities

The job outlook for home economists is generally favorable. Population growth is expected to increase the need for home service and international home economists, particularly in family planning programs. In addition, a growing recognition of the work of these professionals in areas such as consumer education, nutrition, family economics, and child care is expected to result in increased demands for services.

Teaching jobs in elementary and secondary schools are limited and there is considerable competition for available openings. However, home economists with advanced degrees should find broader opportunities for teaching at the college or university level.

The advancement of home economists in any organization is dependent on the gaining of relevant work experience and the completion of advanced education programs.

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DOT Code: Home Economist 096.121.014

For further information, contact:
American Home Economics Association

The health field offers a variety of career opportunities to persons interested in education.

Community health education is an expanding field which emphasizes the importance of preventive health care at the community level. As professionals, community health educators use educational skills and a sound knowledge of public health to educate the public about health and disease and what can be done to maintain good health, prevent disease, or secure treatment.

While the community health educator concentrates on the nonschool community, school health educators are concerned with the school environment. Their main concerns are classroom teaching and those factors which influence the knowledge, behavior, attitudes, and practices that affect the health of students.

Educational therapy is another career area in education of major importance in the health field. Educational therapists work with physically handicapped, emotionally disturbed, geriatric, or otherwise disabled patients in various types of health facilities. Their goal is not only to impart knowledge but also to help patients develop physical capacities and restore a sense of connection with the world and other people.

Career opportunities are also available for teachers in special education. Special education teachers work with pupils who are physically handicapped, emotionally disturbed, culturally different, mentally retarded, or mentally gifted and talented. These students are found in school systems, institutions, hospitals, or rehabilitation centers and, because of their unusual or extraordinary traits, they need the services which only special education can provide.

A career area which occupies a significant place in the health field and presents challenging career possibilities involves the visually handicapped. Professionals in this work provide essential services to blind or visually handicapped persons of all ages and help them to function sucessfully in a sighted world. Among the different types of specialists who work with the visually handicapped are the orientation and mobility instructor, the rehabilitation teacher, and the teacher of the visually handicapped. These and the other career areas mentioned in the preceding paragraphs are discussed in detail in the following pages.

## Community Health Educator

### Public health educator

The basic function of community health educators is to give people the facts about health, the causes of disease, and methods of prevention so they will act for their own well-being and that of their families.

Health educators seldom talk directly to the people they hope to influence. They work instead through a wide variety of intermediaries in the community—teachers, club leaders, health officers, public health nurses, trade-union program directors, Scout leaders, and community group leaders. Through these intermediaries they reach a much larger audience than they would alone, because these intermediaries have a personal relationship with those being educated and are therefore likely to have a greater influence on them.

Health educators meet with groups of these intermediaries and work out health education programs to include in regular daily activities. They also prepare or direct the preparation of guides and materials (leaflets, films, exhibits, slides, and posters) to be used.

Health educators also work with the mass media (newspapers, magazines, radio and television, trade newspapers, and organizational newsletters). They prepare or direct the preparation of appropriate articles, features, and photographs for use by the media, or work directly with the writers, editors, or program directors. As a result, the influence of community health educators is extended to vast audiences that could not otherwise be reached.

Admittedly, contact with the public through the media is less desirable than personal contact. However, in health education, as in other educational efforts, many methods are used to complement and reinforce each other for a cumulative effect.

The ultimate goal of health education is to persuade the person being educated to take the necessary steps for preservation of health or safety. But this goal is not always achieved. Many smokers, for example, continue to smoke no matter how many times they have had the danger pointed out to them. Some people do not use their auto safety belts despite the repeated messages on the importance of using them. The dangers of alcohol and drug abuse are being repeatedly dinned into the minds of young and old, yet alcoholism and drug addiction continue to increase. Considerable health education is offered to the population of inner cities yet much of it is ignored.

Educators have recognized that it is not enough just to point out the hazards of a particular practice or the

advantages of another. The are many obstacles to perception and appropriate action. These may be emotional resistance, language barriers, social and economic barriers, or psychological blocks.

Whatever they are, it is the job of the health educator to identify them and devise methods to overcome or sidestep them. Otherwise, health education will be ineffective or it will not take place, since health education is meant to be more than information—it is meant to motivate effective action.

To overcome resistance, health educators use various techniques of investigation; interviews, surveys, community studies, together with the insights gained from psychology, sociology, and anthropology.

A basic tenet of health educators is that final decisions about health' practices should be made by the individuals involved. Nevertheless, educators accept responsibility for providing access to all sources of information needed by individuals so they can relate desirable health practices to personal goals, aspirations, and values.

Health educators thus serve as psychological stage-setters, stimulating people in the community to recognize health problems of which they may be unaware and to work for their solution. Such problems might be pollution of the environment, chronic disease, overpopulation, drug abuse, or any of hundreds of ills which plague our society today. Health educators know that constructive group action can often accomplish wonders. Even more important, when people work together to solve a problem of common concern, they are more likely to arrive at the solution which will work.

Working with an interested community group when it is ready to act, the health educator helps its members set up effective participating relationships with other interested groups in the community—schools, churches, health agencies, welfare organizations, and labor unions. Perhaps the health educator will assist them in organizing a conference, planning a neighborhood cleanup compaign, or developing a television series dramatizing poor health conditions in farm labor camps. Whatever their duties may be in any particular case, their aim is to encourage more effective individual and group action designed to maintain and improve the health of people throughout the community.

Health educators are prepared to use whatever method of communication is required by a given situation. They are expert in a variety of individual, group, and community educational approaches and how they can be used most effectively. Educators experiment with such educational techniques as closed circuit television and teaching machines to find how they can be utilized optimally in the health field. Sometimes they help a group create its own educational materials—an experience which often leads to greater learning than could result from exposure to the most polished professional teaching aids.

Sometimes the problems in taking health action lie not with the community, however, but with the people providing health services. Clinic hours may be arranged more for the convenience of the professionals than of the public. Clinic workers may be curt and impersonal in their treatment of the people they serve. Advice may be given in technical terms rather than in language that people can easily understand. In those cases, the health educator can play an important role by helping other health personnal plan and deliver health care in ways which the community can and will use. Similarly, community health educators often have the task of educating legislators and other policymakers to consider consumer interests in planning and funding health programs.

With major changes taking place in the delivery of health care at local, regional, and national levels, participation of health educators in planning groups is increasingly in demand. By seeking the involvement of all interested persons, health educators work toward the solution of a particular problem through a variety of possibilities. They help to define common goals and to stimulate and guide discussion to assist various groups in reaching their own decisions and determining how they will be carried out. Thus, whether helping a ghetto neighborhood to plan its own health center or helping representatives from State agencies to agree on needed regional medical facilities, the health educator helps people to help themselves by bringing needs and resources together to create new partnerships for health.

Frequently, improving health care involves training for health workers who need to keep abreast of new knowledge in their own professional disciplines through continuing education; for young people entering new health careers; for neighborhood health aides who will help to improve health communications among the poor; and for special ethnic groups and citizen volunteers who are ready to assume new community leadership. Here again, the health educator can contribute to better health by helping to develop training programs, by suggesting creative methods, and even by training the trainers themselves to be better teachers.

Community health educators constantly seek new insights into human behavior, new ways to apply this knowledge in health education, and fresh approaches to building stronger and healthier communities.

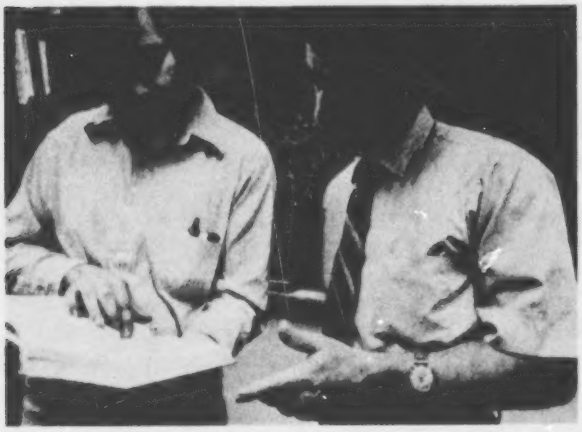
Community health educators are employed in local,

State, and Federal agencies; voluntary health agencies; international health programs; community and regional planning councils' poverty projects; the Peace Corps; hospitals and clinics; industry; agricultural extension services; colleges and universities; and professional societies. The hours and working conditions vary according to location and type of establishment which the health educator chooses.

## Job Requirements

The minimum educational requirement for community health educators is a baccalaureate degree in a program of community health education. These programs (with instruction in the biological and social sciences and basic health education skills) prepare students for many community jobs as well as for graduate study if desired. A bachelor's degree with courses in physiology, bacteriology, chemistry, biology, educational and social psychology, sociology, and cultural anthropology also provides the basic foundation needed for admittance to master's degree programs.

A master's degree in public health or community health education is a requirement for professional or leadership positions in this field. The graduate programs include training in fundamental public health areas, such as disease control, epidemiology, statistics, and environmental health, as well as in-depth preparations in educational program planning and theory and methods analysis of health education problems. Doctoral degrees—traditionally the highest academic degrees available—are also offered in public health education. Many persons with doctoral degrees in this specialty are needed now, and will be needed in the future, to meet the growing demand for research and evaluation skills in health education and for teaching institutions of higher learning.



NIH Div. Research Resources

Like workers in many other health occupations, community health educators should enjoy people and work well with them. They must be able to play a variety of roles successfully according to the demands of the situations. At times these educators work behind the scenes to help others start and carry out projects in the public interest. At times they must be able to help people caught in conflict understand each other's point of view, while they maintain the trust and good will of all parties concerned. And at times educators must be people's advocates until the people come forward to speak for themselves.

## Opportunities

The need for qualified community health educators is expected to increase during the next decade. This outlook is based on the trend throughout the country to expand preventive health programs in schools and communities. Qualified health educators can advance to supervisory and managerial positions concerned with developing, managing, and evaluating health education programs.

DOT Code Public Health Educator 079.117-014

For further information, contact:
Society for Public Health Education, Inc.
Association for the Advancement of Health Education
Association of Schools of Public Health

## Educational Therapist

### Special educator

Educational therapy is part of a prescribed medical-treatment program for patients who are physically disabled, emotionally disturbed, senile, or acutely and/or chronically ill. It is used mainly with patients who because of their disability, are withdrawn, depressed, or agitated, or who feel detached from normal life and reality. As the name implies, educational therapy is a form of teaching. But the purpose is not so much to give knowledge as it is to stimulate interest, confidence, and self-esteem; to overcome abnormal moods and emotions; and to restore a sense of connection with the world and other people. Educational therapy is designed to meet the needs of the individual patient through instruction in prescribed subjects, and it provides treatment and rehabilitation measures to assist in restoring patients to their fullest mental and physical capacities.

As a member of the rehabilitation team, the therapist evaluates present learning ability, retention of previous learning experiences, interests, needs, and future goals of the patients. Using this information, the educational therapist devises a treatment plan which is fitted into the patient's total rehabilitation program. The therapist then starts group or individual training in elementary, secondary, commerical, or vocational subjects to meet the needs and goals of the patient. Subject areas include English, chemistry, biology, mathematics, typing, shorthand, painting, bookkeeping, driver education, basic living skills, and preparation for obtaining a high school equivalency diploma. Course content and teaching methods are adapted to the patient's particular handicap and to the particular purpose for which they are intended.

Educational therapists may administer tests and send results to school authorities or State departments of education for grading and certification of a patient's educational level. They also prepare reports on patients' emotional reactions to, and progress in, individual and group situations in order to provide data for use by the rehabilitation team. Educational therapists also refer patients to community-education services such as colleges, universities, and credit-by-exam programs.

Many educational therapists work in VA facilities such as hospitals, centers, domiciliaries, and regional offices. They are also employed in private and State schools, Federal prisons, the Job Corps, and adult learning centers. Therapists work under doctors' directions in VA facilities, but usually without them in other types of facilities, and they usually work from 8 a.m. to 4:30 p.m. 5 days a week. Their work setting is often unstructured, and therapists are often allowed to organize and conduct patient therapy independently, under the direction of the chief therapist. Clinics are often small, with a staff of three to five therapists who work closely with patients on a one-to-one basis. There are no unusual physical demands in this work, and therapists who are blind, partly or almost completely paralyzed, or use prosthetic devices can be successful if they have adapted to their own disabilities.

### Job Requirements

Certain personal qualities are essential for success in educational therapy. Among these are sensitivity to underlying moods and emotions, strong motivation to help the disabled overcome their difficulties, and the ability to "reach" troubled people and to communicate with them. Before deciding on this field, a student should gain some volunteer experience in a community or institutional health-care setting, with exposure to health and other rehabilitation problems. After completing high school, a student interested in a career in educational therapy must enroll in a 4-year bachelor of arts or sciences degree program. The degree must be in an area such as education or physical education and include at least 12 credits in education. Typical course work includes subjects such as psychology, work with the emotionally disturbed and physically handicapped, diseases of aging, neurological impairments, and the psychology of disability. In addition to a college degree, 2 to 7 months of clinical training are required, either as in-service training or at a training center affiliated with a professional school. While in clinical training, the student observes patient treatments, attends patient conferences, and receives training in all areas of educational therapy. The student works with patients under the guidance of therapists in various areas of work and is evaluated for job performance, completion of clinical projects, and successful completion of a final examination. At present there are also several training institutions which offer postgraduate programs for qualified educational therapists.

Currently, there are no licensing or certification requirements for educational therapists. However, the American Association for Rehabilitation Therapy grants registration to educational therapists with work experience in a clinical therapy setting and/or postgraduate work. Registration is optional but desirable for employment purposes, and by joining an

organization such as AART therapists can enrich their job knowledge through nationwide contact and communication with other workers in their field.

## Opportunities

Employment prospects for educational therapists are expected to be favorable during the next decade. This expectation is based on the current nationwide expansion of rehabilitation facilities and the growing recognition of the importance of education therapy. In addition, as life expectancy increases, there should be a greater need for therapists in programs for the aging. Disabilities developed as a result of military service or caused by daily stress and poor living conditions should also create a number of jobs for educational therapists. Qualified therapists can advance to supervisory positions; promotions are generally based on work experience and completion of advanced education courses.

DOT Code: Educational Therapist 094.227-010

For further information, contact:
American Association for Rehabilitation Therapy

# Orientation and Mobility Instructor for the Blind

**Instructor of the blind**
**Orientor**
**Peripatologist**
**Therapist for the blind**

Orientation and mobility instructors are specialists who teach visually impaired persons to move about effectively, efficiently, and safely in familiar and unfamiliar environments. They work with blind people of differing ages and abilities, from young children to newly blinded adults and persons with multiple handicaps. Their objective is to help each of these individuals to achieve personal adjustment and maximum independence through specialized training. Orientation and mobility instructors evaluate the visual impairments of individuals to determine their level of adjustment, degree of motivation, and the extent and safety of their indoor and outdoor mobility and, based on this information, plan and provide individualized programs of instructions.

Most instructors work on a one-to-one basis and assist all patients in making the maximum use of their remaining senses, primarily auditory (sound) and tactual (touch). They train patients to orient themselves to physical surroundings and use a variety of actual or simulated travel situations to develop the patients' ability to travel alone, with or without a cane. Orientation and mobility instructors evaluate and prepare progress reports on each of their clients and work closely with other professionals such as physicians and social workers, as well as volunteers and families of clients. Orientation and mobility instructors work with others to develop needed community resources within their area of expertise and attend various professional seminars, workshops, and conferences to keep abreast of the latest methods, techniques, and travel aids.

Orientation and mobility instructors are employed in residential and public schools, rehabilitation centers, public and private community-based agencies, hospitals, nursing homes, and homes of clients. Working conditions for instructors vary from facility to facility. However, instructors usually work a 40-hour week, with hours from 8:00 a.m. to 4:30 p.m., and occasionally are required to work on a shift basis. In addition to working at a specific location, they may on occasion accompany their clients to recreational activities and social gatherings.

## Job Requirements

Persons considering a career in this area must enjoy working with people and have the capacity to learn from as well as teach clients. This work requires instructors to work closely with other professionals as part of a rehabilitation team, as well as with families, friends, and colleagues of visually handicapped patients. They should possess mature judgment, emotional and social maturity, adaptability, resourcefulness, and leadership potential.

The basic educational requirement for this work is a bachelor's degree, although a master's degree is preferable. If the BA degree is not in the specific field, and a higher degree is being sought, it is preferred that the BA be in one of the behavioral sciences. Programs consist of combined academic and clinical training; upon completion of the training, graduates are required to serve an internship period. In addition, students entering this field must have no less than 20/40 visual acuity in the better eye with best possible correction and minimum of 140 degree continous field measured together.

The American Association of Workers for the Blind provides certification for orientation and mobility instructors who meet specified education and experience standards. However, there are no nationwide uniform

legal requirements for licensing, certification, or registration which serve as standards for employment. State or local licensing agencies should be contacted to determine current standards.

### Opportunities

Employment prospects for qualified orientation and mobility instructors are quite favorable, and available openings far exceed the number of graduates entering the labor market each year.

Orientation and mobility instructors can advance to supervisory, managerial, and administrative positions in this field. Generally, advancement is based on work experience and expertise and the completion of advanced education courses.

DOT Code: Orientation Therapist for the Blind 076.221-010

For further information, contact:
American Foundation for the Blind

## Rehabilitation Teacher

Rehabilitation teachers are specialists who provide instruction and guidance to visually impaired individuals. They develop plans of instructions which enable their clients to carry out daily activities, develop independence, and achieve satisfactory ways of living. Rehabilitation teachers work with individuals or small groups in the home setting as well as in health care facilities, such as rehabilitation centers, hospitals, nursing homes, retirement homes, or community centers. They must have a broad knowledge of many subjects, and some teachers may specialize in a particular skill. For example, they help newly blinded or congenitally blind persons to develop communications skills by providing instruction in the use of Braille, large print, recorded materials, low-vision aids, and telephones. In addition, they teach nonverbal communications skills, such as facial expressions, hand movements, and head nods for use in communication with sighted persons.

Rehabilitation teachers provide instruction in personal and home management skills necessary for normal living. These skills include personal hygiene and grooming, table etiquette, cooking, budget preparation, child care, and minor home repairs. These teachers also help clients to obtain equipment specially designed for visually handicapped persons, such as Braille clocks and watches, sewing aids, and various types of appliances.

Each client with whom the rehabilitation teacher works is unique. Beyond the obvious fact that they are adults with visual impairment, the most common attribute of clients is that they are individuals with their own needs and desires, levels of functioning, and goals. These differences must be noted and respected by the rehabilitation teacher whose job it is to help the client to reach the level of functioning the client wishes, not to make the client fit into a preconceived image.

### Job Requirements

Students considering this career area can expect to spend 4 to 6 years in preparation after completing high school. The minimum educational standard for entry into this field is a bachelor's degree from an accredited college; however, a master's degree in this specialization is preferable in most cases.

The American Association of Workers for the Blind certifies rehabilitation teachers who meet specified education and experience requirements. However, there are no national standard legal requirements concerning licensure, registration, certification, or continuing education. State or local licensing agencies should be contacted to gather information regarding this matter.

### Opportunities

The need for qualified rehabilitation teachers is growing. This is due to increases throughout the country in the number of visually handicapped persons, particularly among our senior citizens. Each of these persons will need the professional, specialized services which only the rehabilitation teacher can provide.

Qualified rehabilitation teachers can advance to supervisory or administrative positions in health agencies, or to teaching positions in college or universities. Generally, advancement in this field is governed by experience, skill level, and the completion of advanced education programs.

DOT Code: Rehabilitation Teacher 094.227-014

For further information, contact:
American Foundation for the Blind

## School Health Educator

**Health educator**
**Personal hygiene teacher**

School health educators help children and young people develop the knowledge, attitudes, and skills they need to live healthfully and safely. They cooperate closely in this task with the school's physician and nurse, as well as with the school's other teachers and service personnel. Usually, they also participate in community-health activities as representatives of the school health-education program.

Health education has a place all the way from nursery school and kindergarten through high school and on into college, because it deals with day-to-day living. It is health education when 5-year-olds learn to eat new foods, and also when high school seniors make a field survey of the health services available in their community.

NIH Div. Research Resources

Depending on the school system—and on the school grades covered—the health courses usually include such subject matter as family-life education, first aid, safety education, choice and use of health services and products, nutrition, personal hygiene, air and water pollution, alcohol abuse, and community health. Health courses include the principles of mental health and good human relations, as well as of marriage and family life.

School health educators may have even broader responsibilities as health coordinators. School health coordinators may work in a single school or in an entire school system; they furnish leadership in developing and maintaining an adequate, well-balanced health program and in getting all groups interested in the health of the school child to work together effectively.

### Job Requirements

The school health educator needs 4 years of college education leading to a bachelor's degree, with a background in the biological, behavioral, and social sciences, and in health education. Increasingly, a master's degree is required.

The school health educator must meet the regular certification standards for teachers in the State. Generally, these call for 15 to 20 credits in professional courses in a school of education. These courses usually include educational philosophy, the techniques of teaching, child growth and development, and educational psychology. A period of internship may also be required. These standards vary from State to State, and the student is advised to check desired locations for requirements.

For the school health educator, the advanced degree is usually in the field of health education. A doctoral degree is often required for college teaching jobs.

The school health educator should have an aptitude for scientific and social studies. In general, personal qualifications for this educational specialist are similiar to those for the successful teacher in any field. It is important to like working with children and young people and to have patience, a sense of humor, good judgment, and emotional stability.

### Opportunities

According to the American School Health Association, moderate increases are expected in the demand for school health educators. This expectation is based primarily on greater public interest in health

programs as well as on increases in Federal funds available for health education programs.

Health educators can advance to positions as school health coordinators and assume responsibility for health education in an entire school district.Others move into administrative or pupil-personel-service positions within the district's classification system. Promotions to higher levels depend on specific requirements of the particular school districts.

| DOT Code: | Teacher, Secondary School | 091.227-010 |
|---|---|---|
| | Teacher, Elementary School | 092.227-010 |

For further information, contact:
American School Health Association
Association for the Advancement of Health Education

## Teacher of the Visually Handicapped

### Teacher of blind children

Teachers of the visually handicapped provide specialized educational services to children in residential, public, or private schools. Residential schools are those in which blind children live and attend regular classes with other blind children. Teachers in these schools usually concentrate their efforts on teaching a single subject, such as history or mathematics, but they may also be called upon to give special education courses.

The resource program differs from the residential school by allowing students to attend regular public school classes. In this program, a central location is provided for use by visually handicapped students from several school districts. Here the resource teacher provides instruction in special skills, such as Braile or the use of recording devices. In addition, the resource teacher also makes certain that the students' assignments are up to date and that each student has complete lessons in Braille, large type, or recorded form. Besides working directly with visually handicapped children, resource teachers also coordinate their efforts with classroom teachers, school psychologists, and parents to assure that educational objectives are being met.

A third type of program in which teachers of the visually handicapped work is called the itinerant program. In this program, the teachers travel from school to school and meet with visually handicapped students on a regularly scheduled basis. In this way, students are able to attend their regular neighborhood school classes and receive special instruction, without needing to travel to a central school district location. Teachers in itinerant programs also act as consultants on special education to classroom teachers, parents, and school officials. It is important to note that teachers of the visually handicapped, regardless of the type of program in which they work, may be called upon to teach a wide range of regular school subjects plus special education courses.

### Job Requirements

Students considering this career area can expect to spend from 4 to 6 years in preparation after completing high school. The educational minimum for entry into this work is a bachelor's degree from an accredited college; however, a master's degree is preferred in most cases.

The American Association of Workers for the Blind certifies teachers of the visually handicapped who meet specified education and experience requirements. In addition, these teachers must be certified or licensed by the department of education in the State in which they work. Since these requirements vary throughout the country, students should contact the local superintendent of schools, or the State department of education to obtain specific information.

### Opportunities

Employment prospects in this career area are favorable. As greater numbers of visually handicapped children require specialized education services, the demand for qualified teachers is expected to grow. Qualified teachers of the visually handicapped can advance to supervisory and administrative positions or teaching positions at the college level. Advancement is usually based on experience, skill level, and the completion of advanced education courses.

| DOT Code: | Teacher, Blind | 094.227-014 |
|---|---|---|

For further information, contact:
American Foundation for the Blind

Health Information and Communication

Today, the general public has a strong interest in health, medicine, and science and desires information about them. People want to understand what is happening and how new developments will affect their lives and careers. Advanced communication technology has made delivery of this knowledge possible, and the publishing and broadcast media provide their audiences with both oral and written materials in these fields.

In addition, public and private organizations and agencies have a professional interest in keeping the public informed. They know that people who are informed about current developments and discoveries in health and medicine will show greater initiative in getting medical, dental, and preventive care for their families and themselves.

These agencies and organizations also want to keep the public interested and involved in starting and supporting adequate health care facilities in the form of community hospitals, clinics, and mobile screening units.

In addition to the general public, there are other more specialized groups seeking health information. These of course are the various health professionals who require authoritative information to keep abreast of developments in their fields. There are many career opportunities in health information and communications; the following pages discuss the qualifications and duties of: biological photographers, medical writers, science writers, technical writers, and medical illustrators.

Another important part of health information and communications is maintaining medical records and data for various health facilities. Typically, a health facility employs a staff consisting of a medical record administrator, medical record technician, medical transcriptionist, and other clerical personnel to handle all facets of medical information. They prepare medical reports; organize, analyze, and preserve the medical information of patients; and develop a variety of statistical reports. Maintaining this flow of health information is an extremely important function, since it is used in evaluating patient care, diagnosing and treating illness, and planning health-care activities. Careers involving medical records and data are discussed fully in the following pages.

Library services in the health field occupy an important place in health information and communication activities. Year after year a vast store of knowledge accumulates in many branches of medicine, in medical research, and in scientific research related to medicine. This knowledge is recorded in journals and other periodicals, textbooks, monographs, and other publications. These publications, coming from every part of the world, are collected in the medical library, where they are made available to health professionals.

Doctors, nurses, dentists, pharmacists, therapists of various kinds, technicians, and health profession students may come to the library for texts or monographs on a subject of special interest. Or they may search the journals for background material or for research reports on the latest developments in their fields. The medical and scientific journals are also used by research scientists and research students, since these are the main sources of information on what has been done and what is currently being done in their fields.

Libraries are maintained by almost all hospitals, schools, research institutions, pharmaceutical houses and by many other health organizations. They vary in size and function, but all serve to maintain information needed by their staffs, students, patients, or other interested persons. Some of the services provided in the following pages, and two careers—health sciences librarian and health sciences library technician—are discussed in detail.

## Biological Photographer

**Biological/biomedical communicator**
**Biomedical photographer**
**Biophotographer**
**Forensic photographer**
**Medical photographer**
**Scientific photographer**

Biological photographers are scientific professionals responsible for the production of still and motion pictures of subjects for the health professions and natural sciences. They are specialists who apply a complete range of photographic skills creatively to complete a variety of assignments. Their role in health information and communications is becoming increasingly important. They prepare and produce motion pictures, video tapes, prints, and transparencies to document and record a broad spectrum of subjects and events used for education, patient records, research, and as illustrations in publications. Photography is used to document the absence, presence, extent, and progress of a patient's disease or injury and still or motion pictures are used to record and study surgical procedures. Furthermore, photographs of speciemens can be magnified to serve as records or to illustrate unusual medical conditions for use in classrooms or research laboratories. Biological

photographers also participate in the planning, coordination, production, and dissemination of educational programs encompassing both visual and sonic media, and they are key personnel in any project in which recording of diagnosis, treatment, special technology, or any other aspect of health care is critical.

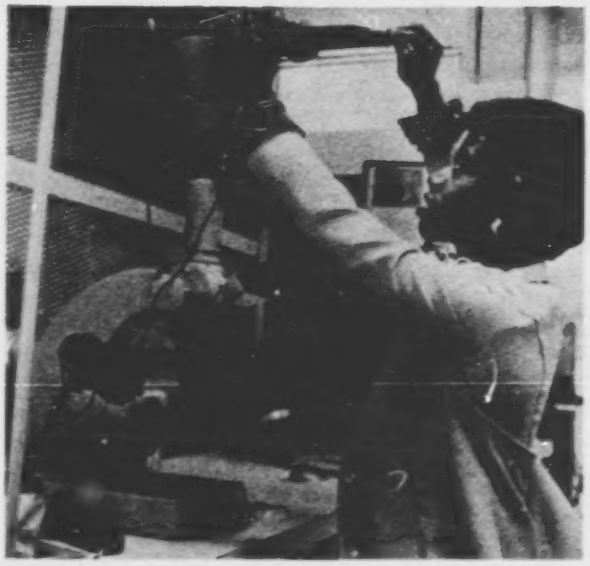
Currently, a biological photographer can specialize in one of several areas. Ophthalmic photography, for example, involves the use of specialized equipment and techniques to photograph disorders and injuries of the eye; photomicrography involves photographs taken through a microscope; and cinematography is the production of motion pictures. Other specializations include dental photography, which records dental techniques and procedures, and autopsy/specimen photography, in which post-mortem or surgical specimens are documented.

Biological photographers are employed by many public and private hospitals; universities; medical schools; Federal health organizations; research institutions; dental, veterinary, or natural science facilities; and some private medical and pharmaceutical suppliers. For the most part, they work regular hours, within normal hospital, office, or laboratory environments, and are not normally required to travel extensively. Occasionally, the physical conditions under which a biological photographer works change quite dramatically. For instance, he or she may spend some working time in close contact with patients, doctors, and staff members and some time in isolation, working in the darkroom. Biological photographers may also come in contact with harmful chemicals, strong odors, and contagious diseases when carrying out assignments. The biological photographer must, therefore, have the ability to adapt to a wide range of tasks and environmental conditions in addition to being skilled and creative in this profession.

## Job Requirements

There are several ways of preparing for a career in biological photography. A number of colleges and universities offer full 4-year programs leading to a bachelor's degree in this field. Other educational institutions provide training in 2-year programs and grant a certificate or associate's degree. One of the accrediting agencies for these training programs is the Biological Photographic Association. Many individuals acquire skills in this work by successfully completing on-the-job or apprenticeship training programs which may last up to 2 or 3 years.

Certification in this field is not mandatory, but those seeking certification may obtain it through the Board of Registry of the Biological Photographic Association. The prerequisites for certification are 2 years of satisfactory employment or training in an accredited school, plus successful completion of a three-part examination. While many employers do not make certification a requirement, some consider it when recommending promotions. It is considered an advantageous credential to persons entering the field and seeking initial opportunities. Individuals considering this work should contact prospective employers to determine general requisites before making final educational or training arrangements.



## Opportunities

Growth in biological photography is quite rapid and is closely related to the entire health care industry, the growth of medical education, and the increased documentation requirements of government and independent agencies. Since photography occupies an increasingly significant place in scientific and medical research and education, opportunities are expected to be favorable for those with these specialized skills.

Advancement opportunities in this field, as in many other health career areas, depend on the individual systems worked out by the employer. Government agencies usually have career ladders with several steps, each of which represent an advancement opportunity. Private industry and education may have other opportunities. The biological photographer typically ad-

vances from photographic technician through photographer positions to department or service head. Possibilities also include general health facility administration or related positions in education for individuals with advanced degrees or experience.

DOT Code: Biological Photographer 143.362.010

For further information, contact:
Biological Photographic Association
Health Sciences Communications Association

## Health Sciences Librarian

### Medical librarian

Health services librarians provide essential services to professional staff and personnel in medicine, dentistry, nursing, pharmacy, the allied health professions, and other related technologies. Since the health field and related fields are growing rapidly, professional staff need quick and efficient access to large volumes of information and materials in order to keep abreast of current developments, new procedures and techniques, and other relevant data. The various data are used in education and training programs, in exchange-of-information activities of different health professions, and in biomedical research. Health sciences librarians make this information available to those who need it, using knowledge of both library science and health sciences.

Depending upon the size of the facility in which they work, health sciences librarians may have charge of an entire library or may be assigned to one or more specific functions. They select and order books, journals, and other materials and classify and catalogue acquisitions to allow for easy retrieval. Other duties include preparing guides to reference materials, compiling bibliographies, and selecting and acquiring films and other audio-visual materials.

Readers and researchers frequently call on the specialized skills of the librarian to track down information on a particular subject. The material may be in obscure documents or scattered in many places, requiring a bit of detective work to find it. If the document is in another language, the librarian may be called on to obtain a translation. Frequently, the librarian is asked to compile bibliographies or provide a comprehensive review or summary of a particular subject.

Aside from serving in person, the librarian also responds to mail or phone inquiries. Success in handling these inquiries depends largely on the librarian's skill. Librarians may have only very general knowledge of medicine, but they must know how and where to locate all types of information on short notice.

In a hospital, the service offered by the medical library depends on such factors as whether the hospital conducts research and training and the categories of illness treated. Some hospitals have separate libraries: medical, nursing school (if one exists), and a patients' library. More and more, however, these are being grouped together under the direction of one chief librarian, with assistants in charge of the separate services.

The librarian also plays an important role in the hospital rehabilitation service, and librarians serving patients provide book-cart services, develop programs of interest for ambulatory patients, and visit new patients to learn about their reading interests. In addition to hospitals, medical librarians work in schools of medicine, nursing, dentistry, and pharmacy; research institutes; pharmaceutical houses and similar industries; health departments; professional societies; and voluntary health agencies. Medical libraries are found in numerous locations throughout the country but tend to be concentrated in or near population centers. Individual size and working conditions vary greatly from library to library. For instance, hospital libraries are usually much smaller than university libraries, ranging from a staff size of one to slightly under 100. Surroundings are almost always pleasant and free of hazards or unusual environmental working conditions.

### Job Requirements

To be a successful medical librarian, the prospective student needs to have a genuine respect for the printed word—for the publications that record the progress of science. Because the librarian deals with people as much as with books, friendliness and the capacity to understand and share other people's interests are equally important.

A bachelor of arts or bachelor of science degree is required for entrance to any of the 65 schools of librarianship in the United States and Canada accredited by the American Library Association. These schools offer 1- or 2-year programs leading to a master of science or master of arts degree in library science. Since admission requirements of the individual schools vary slightly, the candidate is advised to write to the school for specific information in this area. Many schools offer postgraduate programs leading to a doctor of philosophy or doctor of library science degree.

During the undergraduate college years the student may concentrate in one of several areas and could major in any of the following subject areas:

- Biological science: biology, zoology, embryology, anatomy, physiology.
- Behavioral and social science: psychology, sociology, economics, anthropology.
- Humanities: foreign language, history, literature.
- Physical sciences: chemistry, earth sciences, physics, mathematics.

In addition, good reading knowledge of at least one foreign language is necessary and a fair degree of fluency in several is helpful.

Certification is desirable but not compulsory. The certification requirements developed by the Medical Library Association (MLA), which is the certifying agency, include a master's degree in library science from an accredited library school, a passing grade on the MLA certification examination, and 2 years experience at the professional level in a health sciences library. Continuing education programs, which range from ½ to 2 days in length, are also offered by the Medical Library Association. These programs are designed to keep members informed of the latest developments within the field, new library science techniques, and emerging subject areas.

## Opportunities

Employment prospects in this field are average. Currently, there is a demand for health sciences librarians, but the job market is becoming tighter. As medical centers expand or new medical schools are established, greater emphasis will be placed on educationally and technically qualified personnel.

Advancement in this field is usually based on a demonstration of good professional skills, but the size of the library in which the librarian works also has a major effect on advancement possibilities. There is much more opportunity for advancement, in the traditional sense, in a large medical facility than in a small one. However, the duties and responsibilities in a small library may provide the librarian with compensating rewards in terms of greater challenge and variety. Because there is wide variation in the advancement opportunities, the individual seeking a career in this field must consider his or her own personal goals and aspirations and how they relate to the opportunities available at a particular facility before accepting a position.

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DOT Code: Medical Librarian Ver. 137-026

For further information, contact:
Health Sciences Communications Association
Medical Library Association

# Health Sciences Library Technician

Health sciences library technicians are paraprofessionals who, along with the librarian, perform important functions in a health sciences library. Their assignments and responsibilities vary considerably, depending on the size of the library. In a larger library, health sciences library technicians may perform specific library procedures under professional supervision or supervise the work of others in a department. In a smaller library, the technician may be responsible for the library's entire operation, and he or she functions within a library network, under professional supervision.

The basic duties of technicians include providing information to users regarding catalogs and bibliographic aids and answering routine inquiries in person or by telephone. They perform simple cataloging and filing tasks and verify the accuracy of order requests. Technicians sometimes supervise the activities of workers in specialized sections or departments of a library. For example, they may oversee card preparations in the catalog section or the routine activities of the circulation or acquisition section. Almost all assignments require good clerical skills. However, even more important is an understanding of library functions and the development of library science skills, because the health sciences library technician may be

called on to perform many of the duties of the health sciences librarian or to handle the details involved with those duties.

Health sciences library technicians are employed in many types of facilities, including hospitals, medical centers, universities, research centers, and medical schools. The libraries are numerous and located throughout the country, but tend to be concentrated in or near population centers. Individual size and working conditions vary from library to library. For instance, hospital libraries are usually much smaller than university libraries, ranging from a staff size of one to slightly under 100. Surroundings are usually pleasant and free of hazards or unusual environmental conditions.

## Job Requirements

Employer requirements for this work vary considerably, and there are no uniform standards with regard to vocational preparation. At present, there are 230 general library technician programs offered in community and junior colleges. However, since there is no accrediting organization for these programs, curriculums vary considerably. The Medical Library Association expects to implement a certification program for technicians in 1979 and has proposed specific training guidelines.

The Medical Library Association suggests that training for health sciences library technicians be a full-time course of study, equivalent to 2 academic years after completion of high school. The MLA recommends that the curriculum for the library technician cover three broad areas: general education, with emphasis on communication skills; biological sciences; and social sciences (50%); library technology (30%); and medical specialization (20%). It is also felt that business and office skills should be prerequisite to admission to the library technician program. The certification requirements proposed by the Medical Library Association are likely to include an A.A. degree or the equivalent of 2 full years of college level work, a passing grade on the MLA certification examination, and 2 years of experience in a health sciences library within the previous 10 years.

## Opportunities

The employment outlook for health sciences library technicians is favorable. The need for technicians is expected to increase as medical and health institutions expand library facilities to keep pace with continuing education demands. In addition, some institutions are restructuring professional librarian jobs so that technicians now perform some of the tasks of the librarian. The possibility of advancement is influenced to a large degree by the size of the employing institution and may vary considerably from employer to employer. Currently, there are no formal, recognized advancement possibilities in this occupation, and advancement will depend a great deal on the individual policies of the employing institution. Generally however, promotions are based on skill levels attained through work experience and the completion of advanced education courses, such as a master's program in library science.

DOT Code: Library Technical Assistant 100.367-018

For further information, contact:
Medical Library Association

# Medical Illustrator

### Graphic communicator in medicine
### Medical artists

Medical illustrators can best be described as paramedical artists who illustrate medical or biological subjects, using many types of visual presentation. Historically, detailed and complicated drawings of life systems were done by artists because drawings were the only means available to capture and communicate the essence of scientific subjects. At one time, the illustrator's work was limited to drawings and charts for medical journals, textbooks, monographs, and similar publications. Later, additional technical training became necessary as a variety of graphic arts techniques began to be used to illustrate surgical procedures, anatomical and pathological specimens, clinical disorders, and micro-organisms.

Today medical illustrators have broadened their scope and use drawings, models, photography, exhibits, and television to record facts and progress in many health fields, and they work with physicians, research scientists, educators, and authors. Illustrators tend to specialize along lines required by the employer. For example, a medical book publishing company may need illustrators with special photographic or illustration skills; a museum may require an illustrator with a strong background in medical sculpture; or a medical research center may require an illustrator able to sketch surgical procedures in the operating room. Illustrators may also work with specialists in subjects such as anatomy (structure of the body), pathology (study of diseases), embryology (development of the body), and ophthalmology (structure and surgery of the eye).

The health professions depend on the illustrator to produce visual presentations for their own use and for the public, and scientific illustrations are now widely used in general magazines, professional journals, textbooks, exhibits, and pamphlets. Medical education relies heavily on the work of medical illustrators, and with recent advancements in instructional technology, using specially prepared audiovisual materials for teaching in medical and health sciences, the medical illustrator's role of visual interpretation has expanded into a variety of new applications. For the most part, medical illustrators are employed by or do freelance work for hospitals, clinics, medical schools, public and private research institutes, large pharmaceutical firms, and medical publishing houses. Regardless of where they are employed, their final illustrations must present the visual communication of information in a clear and aesthetic fashion.

## Job Requirements

Students intending to become medical illustrators should be science minded, with the scientist's capacity for accurate observation, and they must have the ability to visualize with imagination and persevere in application. Medical illustrating is not a career for everyone interested in art. High school studies should include biology, other science courses, foreign languages, and courses in design. Students should evidence interest in various graphic art forms—still life drawing in particular—and maintain a portfolio demonstrating ability in several media. Programs of education for medical illustrators require 6 or 7 years of college-level study beyond the high school level.

Schools of medical illustration usually require 4 years of college prior to admission, plus a good academic record. The college curriculum should include courses in art, science, and the humanities since these provide the best preparation for advanced studies. Art courses should include drawing, painting, color theory, design, life drawing illustration techniques, layout, photography, and typography. Science courses should include zoology, vertebrate anatomy, embryology, physiology, and histology. The prerequisties vary somewhat according to the different schools.

Individuals applying to medical illustration schools are given personal interviews, and must present a portfolio of drawings demonstrating talent in life drawing and design and techniques such as stipple drawing, pen and ink, and watercolor. Programs of study last 2 years or more, and a master's degree is awarded by most schools. The master's curriculum includes courses in photography, advanced anatomical sketching, medical and television graphics, gross human anatomy, and techniques of molding.

The Association of Medical Illustrators has established minimum accreditation standards for the professional training of a medical illustrator, and only five U.S. schools thus far have received accreditation. They are the Medical College of Georgia (Augusta, GA), University of Illinois College of Medicine (Chicago, IL), John Hopkins University School of Medicine (Baltimore, MD), University of Michigan School of Medicine (Ann Arbor, MI), and University of Texas Health Science Center at Dallas (Dallas, TX). An individual seeking membership in the Association of Medical Illustrators must be a graduate of an accredited program or have at least 8 years of experience in the profession. In addition, the individual must submit a portfolio of medical art which meets the standards of the association. Since employers rely on the Association of Medical Illustrators to set professional standards and announce open positions through this organization, membership in this association is useful.

## Opportunities

Employment opportunities for medical illustrators are favorable, and promotional prospects are best for the illustrator with master's credentials and membership in a recognized professional association. Accomplished illustrators may become directors and assistant directors of medical illustration service units in teaching medical centers. Master's degree illustrators who hold positions in centers can advance to full professor or serve as audiovisual coordinators of subordinate illustrators, photographers, and writers.

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DOT Code: Illustrator, Medical and Scientific 141.061-030

For further information, contact:
Association of Medical Illustrators
Health Sciences Communications Association

# Medical Record Administrator

**Registered record administrator**

A medical record is a permanent document giving a complete and unbroken account of a person's illness or injury and the medical services rendered while in a health-care facility. A medical record would include the following kinds of information: when and how the condition first came to medical attention, how the diagnosis was arrived at, how the condition was treated, what operation was performed and the outcome, the schedule of treatment, the tests made, and the course of the patient's condition during the stay in the health facility. A great deal of material must be gathered and checked: patient's medical history, results of the physical examination, diagnosis, laboratory findings, medication, temperature readings, progress, and notes. From this record all health professionals involved in the care of the patient can tell at a glance what treatment has been given and what treatment is being planned. The importance of medical records can never be overemphasized. While duties vary with the size of the facility, the medical record administrator is responsible for seeing that complete medical records are developed and preserved for all patients treated in the facility and that the confidentiality of these records is safeguarded. This involves the overall management of health-information systems that meet the medical, administrative, ethical, and legal requirements of the health-care delivery system. Administrators direct and coordinate the activities of personnel in the medical record department. They plan and develop information systems that provide for efficient receipt, recording, storage, and retrieval of medical data.

Medical record administrators supervise, train, and provide assistance to medical personnel engaged in gathering and analyzing statistical data from medical records and reports. These data are used by medical teams; researchers; and community, state, and national health agencies. Administrators assist medical staff in evaluating the quality of patient care, and they may act as consultants to various types of health-care facilities, health data systems, health-related organizations, and governmental agencies. The medical record administrator may work in the medical record department of a general, specialized, or teaching hospital; ambulatory care center; outpatient clinic; rehabilitation center; professional services review organization; health maintenance organization; insurance agency; local, state, or Federal Government health care institution; college; university; research or computer center. Working conditions in general are very pleasant. Computers, microfilm, and microfiche equipment are some of the modern aids used to carry out the functions of this position. The medical record administrator associates with all members of the health-care team, including hospital administrators, doctors, nurses, and therapists. The work is exacting and demands a sense of responsibility.

## Job Requirements

Professional training in this work involves 4 years of study after graduation from high school. Students may choose from three different methods of preparation. The first entails enrollment in a 4-year college course leading to a bachelor's degree in medical record administration. The second involves taking the first 2 years of college study at any regionally accredited college or junior college and transferring for the last 2 years to a baccalaureate program in medical records at a college or university offering the program. Third, the student may choose to take an accredited 1-year postgraduate certificate program following completion of a baccalaureate degree in liberal arts and science, with certain specified prerequisites in science and statistics.

In addition to liberal arts and sciences, the student medical record administrator studies anatomy and physiology, medical terminology, medical record administration, statistics, medical law, data processing, administration, fundamentals of medical science, and will have an opportunity for carefully supervised practice in accredited health-care institutions. Entrance requirements and course titles vary from school to school, and prospective students should obtain information directly from school officials. College and university programs for medical record administrators are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation and the American Medical Record Association (AMRA). The registration of medical record practitioners is voluntary, and is achieved through an examination administered by the American Medical Record Association. On successful completion of the examination, the administrator may use the professional designation of Registered Record Administrator (RRA). In order to maintain the designation (RRA), the individual is required to meet specified continuing education standards and continue as a member of AMRA.

## Opportunities

Employment opportunities for graduates of approved medical record administrator programs are expected to be very good in the next several years. This estimate is based on such factors as the greater use of health facilities by the general population and the increased need for detailed health-record information by insurance carriers and the various goverment-sponsored health programs. In addition, the need for developing newer and more efficient information systems, as well as for standardizing recordkeeping practices in all types of health facilities, should increase the demand for qualified workers.

Qualified administrators can advance to such positions as department head or assistant to a hospital administrator, or they may specialize and advance in information, research, biostatistics, and management and computer systems activities. Administrators may also advance to higher level faculty positions in colleges and universities by meeting traditional experience and educational requirements.

DOT Code: Medical Record Administrator 079.167-014

For further information, contact:
American Medical Record Association

# Medical Record Technician

### Accredited record technician

Medical record technicians provide essential services in the medical record department of a health-care institution or agency. Their duties vary, depending on the size of the facility. For example, in a small health-care facility, medical record technicians may have full responsibility for the operation of the medical record department. In a large facility, technicians may specialize in a particular phase of work performed within a department. Generally, however, medical record technicians perform the following duties: They provide assistance to medical record administrators by performing many technical activities within a department. They organize, analyze, and technically evaluate health records according to established standards to insure completeness and accuracy. They code symptoms, diseases, operations, procedures, and other therapies according to standard classification systems and post codes on medical records to facilitate retrieval of information at a later time, if necessary. They maintain and use a variety of health-record indexes and compile a variety of administrative and health statistics for public health officials and others.

Medical record technicians prepare health data for input into computers, where it is stored and can be retreived when needed. They assist the medical staff by tabulating data from records for research purposes and maintaining special registries showing occurrences of disease by type, such as cancer, injury, or stroke. Technicians also provide health information to administrators for use in evaluating and planning health-care services and programs. Other responsibilities include preparation of records for microfilming and supervising the work activities of medical record clerical staff. Medical record technicians help to maintain the flow of health information to authorized personnel and may be called up to present medical records during proceedings in a court of law. These technicians must be patient, thorough, and exacting in their duties, and they do whatever is required to protect the privileged medical information under their jurisdiction.

Traditionally, medical record technicians have been employed primarily in the medical record department of hospitials. However, with the expansion of health-care needs, technicians are also finding opportunities in ambulatory health-care facilities; industrial clinics; skilled nursing facilities; local, state, and Federal health agencies; and large group medical practices. Generally, technicians work in pleasant, well-lighted, and air-conditioned surroundings.

## Job Requirements

Most technicians are high school graduates who have completed a college or hospital program accredited by the American Medical Association's Committee on Allied Health Education and Accreditation and the American Medical Record Association (AMRA). The majority of these programs are 2-year college programs leading to an associate degree, while the hospital courses are 1 year in length, with a certificate awarded upon completion. The curriculum of these programs includes subjects such as anatomy, physiology, medical terminology, medical record science, business management, and secretarial skills.

There are no licensing or certification requirements for this work. An individual wishing to become an Accredited Record Technician (ART) may do so by passing a national qualifying examination administered by the American Medical Record Association (AMRA). Accreditation is voluntary, but it is also a valuable credential recognized throughout the field. In order to retain Accredited Record Technician (ART) status, individuals

are required to meet specified continuing education requirements issued by AMRA.

## Opportunities

The prospects for jobs in this field are excellent. The demand for qualified medical record technicians is likely to exceed the supply for some years to come because of the great increase in numbers and types of health facilities. A skilled medical record technician usually can choose from a variety of well-paying jobs in desirable communities. Qualified medical record technicians can advance to supervisory or department head positions, depending on the type and structure of the health organization. Some technicians with broad experience function as consultants and others advance to administrative positions by meeting experience and advanced educational requirements. Technicians in government agencies are able to advance through the traditional methods of civil service.

DOT Code: Medical Record Technician 079.367-014

For further information, contact:
American Medical Record Association

## Medical Transcriptionist

As the health field continues to grow, so does the task of organizing and recording the large volumes of medical data generated by this expansion. The medical transcriptionist, a skilled member of the medical-record team, plays an important role in this activity.

The medical transcriptionist uses a typewriter to transcribe technical dictation which is reproduced on a tape or recording machine, or at times is in written form. The dictation consists of medical reports which describe diagnostic workups, therapeutic procedures, and clinical summaries that are essential parts of an individual's medical record. These data are also channeled to physicians or to other health-care facilities involved with the medical care of the individual. The preparation of complete and accurate medical records is indispensable not only for diagnosis and treatment but also as a source of information for use in health statistics, medical-scientific research, and legal claims.

Medical transcriptionists are employed in many types of establishments, including public and private medical clinics, hospitals, medical centers, extended-care facilities, medical research groups, and city and state health departments. They also work in pharmaceutical houses, physicians' offices, and public and private health organizations. Generally, transcriptionists work in pleasant surroundings which are air-conditioned, quiet, and free of distractions.

## Job Requirements

Anyone considering this career should be a high school graduate or its equivalent and have the ability to type at an average rate of speed. Completion of courses in science, health, mathematics, anatomy, and office practice are useful in addition to a sound understanding of spelling, vocabulary, punctuation, and grammar. Other requirements include normal hearing ability in order to use transcribing equipment and the ability to learn medical terminology in post-high school courses. One method of study to develop skills in this work is a correspondence course in medical transcription offered by the American Medical Record Association. This course can be taken as a home-study or in-service training program, and a certificate is awarded upon successful completion of the program. This certificate is considered to be a useful credential when applying for openings in this field. Other methods of preparing for a career in this work include formalized vocational or on-the-job training programs.

NIH Div. Research Resources

## Opportunities

Employment prospects for medical transcriptionists are favorable. The importance of medical records in research and the growing use of computers to store and retrieve medical information is expected to increase the demand for workers to transcribe various medical reports. Detailed information required by third-party payers such as insurance companies and Medicare should also cause some growth in this occupation. Transcriptionists who develop added skills through continuing education may advance to supervisory positions.

DOT Code: Medical Transcriber 203.582-058

For further information, contact:
American Medical Record Association

## Medical Writer

Medical writing is not a well-defined profession with a prescribed course of training and a standardized licensing or certification procedure. On the contrary, it is a field characterized by its practitioners' diversity of background, expertise, and professional responsibilities and activities.

The past decade has seen a proliferation of college and university courses in medical writing and in the closely related areas of health education, scientific communication, and technical writing. Few medical writers, however, have had formal training in their specialty. Most continue to enter the field through "the back door."

Medical research reports, textbooks, and other highly technical materials are often written by physicians, allied health professionals, or scientists. But the great majority of medical writers do not have advanced training in a health-care discipline.

Individuals with good communication skills, a basic knowledge of the life sciences, and an interest in health care or in medical research and development are finding career opportunities as medical writers in the mass media, the medical press, industry, hospitals, medical schools, and other settings. Technological, clinical, and sociological changes in the field of medicine and health are occurring at an unprecedented rate. As a result, both health-care professionals and the general public provide vast audiences for medical news, information, and instructional materials at virtually all levels of sophistication and in all media of communication.

For example, in response to the public's keen interest in medicine and health, many newspapers, magazines, radio stations, and television stations today employ trained journalists who function as science writers and specialize in interpreting scientific and technical developments for the general public. Their job is to acquaint the public with what is happening in the field of medicine—new treatments for cancer or heart disease, improved surgical techniques, research gains for the mentally ill, and changing concepts of health care. Like other science writers in the mass media, medical writers not only report, but also interpret. Unlike sports writers, whose audience is already familiar with the subject, writers in the health field must explain new and complex developments in nontechnical terms that can be readily understood by a lay audience. Moreover, because of the critical nature of the subject, medical writers must be meticulously accurate and objective in presenting facts. The physicians, scientists, and health

administrators to whom medical journalists look for information will hesitate to talk freely unless they know the writers are competent and trustworthy. Similarly, the confidence of the public depends on the writers' caution and integrity. Since these writers deal with experts from every branch of medicine and related disciplines, they must have at least a speaking acquaintance with the health sciences. Medical writers might interview neurosurgeons one day, pharmacologists the next, and biomedical engineers the next. They must be able to ask pertinent questions, weigh the value of the answers, and obtain additional supporting evidence. Finally, they must know how to present information so it will not be misunderstood.

Other medical writers with training or experience in journalism—or in its "sister" discipline, public relations—are employed by hospitals, clinics, medical schools, voluntary health agencies, and medical societies as health information specialists. These communicators are responsible for keeping the public as well as their organization's personnel, clients, and supporters informed about the achievements, programs, and concerns of the organization. To generate and sustain good public relations, health information specialists may develop informational brochures, plan exhibits, publish "in-house" newsletters and magazines, arrange press conferences, or prepare news releases for the mass media. To accomplish these tasks, health information specialists must have a working knowledge of almost every medium of communication.

Medical writers sometimes function as technical writers specializing in reporting and writing about scientific and technical developments, primarily for users. In industry, and to a lesser extent in nonprofit medical research laboratories, there is growing demand for individuals who have a basic knowledge of electronics, biochemistry, or other technical subjects, as well as good communication skills and an interest in medicine and health. Developers and manufacturers of sophisticated diagnostic and treatment devices such as electrocardiographs, computerized imaging systems, heart-lung machines, and hemodialysis equipment employ medical writers in a variety of capacities. As in other settings, scientists, engineers, and health professionals working in industry rarely have the proficiency and time to meet all needs for scientific and technical information—hence the demand for medical communicators who can digest complex source material and write clearly and accurately for diverse audiences. Medical writers may produce promotional literature for health professionals and administrators or educational information for patients. Like other technical writers, they may prepare instruction manuals for operating and maintenance technicians; proposals; or reports for scientists and engineers, for management, or for a company's stockholders. With increasing application of computers in medicine, some medical writers are now involved in development of software. To become familiar with their subject, these writers may study technical books, journals, working papers, and mathematical data; interview scientific personnel; or tour laboratories, hospitals, and field stations. Often they simply work with the "raw material" provided by scientists, engineers, and health professionals.

Medical writers may find similar career opportunities in the pharmaceutical industry, which invests great amounts of money in research and development of new drugs and new applications for existing drugs. Pharmaceutical companies have steady need for individuals who can assist in documenting and reporting new discoveries and in promoting product lines. Pharmaceutical writers may prepare abstracts of journal articles; package inserts (descriptions of a drug's actions, indications, contra-indications, and side effects); or reports of research findings. They may write market research reports or articles for "in-house" periodicals. Those with a creative bent may produce sales brochures, advertising copy, or other promotional material; scripts for educational films or closed-circuit broadcasts; or exhibits to be displayed at medical conferences. Like their counterparts in the medical-equipment industry, pharmaceutical writers use all possible sources to become familiar with their subject.

Medical writers are employed by government agencies, companies that publish newspapers and magazines for health professionals, advertising agencies, film and art studios, and book publishing companies.

Within most settings there are opportunities for communicators at all levels of experience and expertise—and, quite often, for freelancers, who are hired for specific assignments as the need arises. Responsibilities in the field of medical writing span a wide range. At one end of the spectrum are such critical but relatively simple tasks as editing others' writing to insure grammatical correctness and clarity of presentation, checking the accuracy of references, or proofreading. At the other end is such challenging and sophisticated work as writing books on medical subjects for laypersons, directing a corporate publications department, or designing and managing a new periodical.

In general, medical writers work in comfortable and

well-lighted surroundings. They usually work a 40-hour week but may be called upon to put in additional hours to meet publication deadlines.

## Job Requirements

While there are no uniform standards for entry into the field, a bachelor's degree from a 4-year college is generally considered to be a minimum requirement. To develop the background and skills essential to a medical writing career, students should take as many courses as possible in the life sciences and in English composition, journalism, or a related discipline. In addition, a few basic courses in electronics, electrical, and mechanical engineering or in basic physics can be useful. Though graduate education is not a formal requirement, more and more medical writing jobs are going to individuals with advanced degrees in scientific, medical, or communication specialties.

Perhaps more important than a specific educational background are personal characteristics such as the ability to think clearly and precisely, to pay close attention to detail, to handle the English language with ease, and to deal comfortably with a variety of people.

## Opportunities

Employment prospects in this field are favorable. Opportunities for qualified medical writers tend to grow in direct proportion to: accumulation of new data from basic research and clinical studies; increasing sophistication of both experimental and clinical technology; growing use of audiovisual teaching techniques; increasing numbers of medical conferences and workshops; growth of medical-specialty journals and news publications for health professionals; need for more frequent updating of medical textbooks; greater use of computers in medicine; creation of new abstracting and indexing services; and mounting public interest in health-related information and issues. Today we are in an era of increasingly complex diagnostic techniques, constant therapeutic discoveries, growing interest in prevention of disease and disability, and enormous expenditures on health-care services and products. Consequently, the need for well-trained and informed medical writers has never been greater. However, since many people are interested in this type of career, there may be heavy competition for jobs, especially in the mass media. Individuals considering a career in medical writing should carefully evaluate the labor market in the area in which they intend to work.

They should recognize, moreover, that, as in most professions, the skills helpful for entry may not be sufficient for advancement. For example, a recent college graduate with a major in biology, a minor in English, and perhaps some typing ability may find employment as an editorial assistant in a research laboratory or in a medical publishing house. However, to advance to a position such as director of communications for a research laboratory or series development editor for a medical publisher, the individual would have to acquire additional knowledge of medicine, become expert in many facets of communication, and develop whatever other skills may be required in a particular setting or particular medium. Skills necessary for advancement may be acquired through continuing education, practical experience, or both. In general, those who advance in this field are avid readers, careful researchers, meticulously accurate writers, flexible stylists who can adapt to the requirements of various media, and disciplined and dedicated workers who recognize the importance of deadlines.

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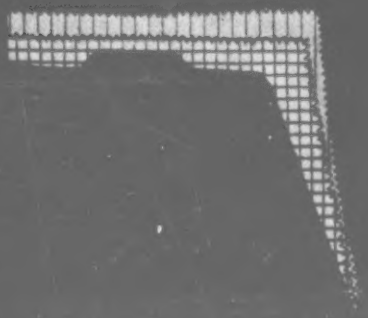
DOT Code: Writer, Technical Publications 131.267-026

For further information, contact:
American Medical Writers Association
National Association of Science Writers
Society for Technical Communication

Health Services
Administration



The field of health services administration offers a wide range of challenging career opportunities to men and women interested in the health profession. The challenge lies in developing and administering health-care systems which provide the best possible medical and health services to the greatest number of people. Administration of such systems requires careful coordination of health resources, skilled personnel, and modern medical equipment. The demand for competent administrators is a result of the growth in official, voluntary, and semi-official health organizations and of the recognition of the critical role of administrators in the health-care delivery system.

Generally, health administrators spend a great deal of time in planning activities such as determining the direction and goals of an agency or institution and the methods to be used to achieve them. In addition to supervising the work of subordinates, administrators direct and coordinate varied and complex management functions, including fiscal planning, program evaluation, personnel administration, and policy development.

Obviously, a sound knowledge of management principles and practices is essential preparation for a career in health administration. Once an individual develops managerial skills, he or she may choose from different career options, including positions in hospitals, mental health facilities, rehabilitation and ambulatory-care centers, nursing homes, and long-term care facilities. In addition, administrators are also employed by health-planning agencies, consulting firms, research organizations, voluntary health agencies, and government health agencies and facilities, including the armed services. These organizations vary in size from small consulting firms employing five or six persons to large urban hospital complexes employing thousands. Regardless of the type or size of the organization, the health administrator is responsible to the community and must bring to this work managerial talent, a commitment to public service, and a high degree of integrity.

Another important career in health services administration is that of medical secretary. Medical secretaries assist physicians by performing the administrative and clerical tasks common to medical practice. They work without close supervision; are required to exercise initiative and good judgment; and are responsible for the efficient operation of the medical office, whether it be in a physicians' group, a hospital, or a public health department.

In the following pages, selected careers in health services administration are presented in greater detail.

## Health Services Administrator

The health services administrator plans, organizes, coordinates, and evaluates the services and resources needed to provide health and medical care to patients in a health facility. Working under the authority of a governing board, the administrator performs a wide variety of functions according to policies set forth by this body. The responsibilities of the administrator are varied and often complicated and may require the collective cooperation of the medical staff and the various support personnel of the facility.

Health services administrators are responsible for establishing policies and procedures and seeing that they are carried out and understood by various department heads within the facility. They set up organizational units, arrange for staffing, and delegate authority as required to meet unit objectives. The traditional management functions of administrators include planning and coordinating departmental activities, financial planning, personnel, purchasing, budget preparation and control, quality assurance, patient services, and public relations activities. Administrators in smaller facilities often deal firsthand with various management problems, while those in larger organizations employ assistants who supervise activities directly.

Administrators meet regularly with department heads and the staff of other units to keep abreast of developments and to resolve work problems. They prepare operating reports for review by superiors and actively participate in the activities of community agencies, health associations, and professional groups to aid in the further development of health and medical services. The principal function of the administrator is making sound decisions, taking into account all of the complexities involved with managing the health-care system. This calls for maturity and leadership ability as well as technical skills.

Health services administrators work in a variety of facilities such as hospitals; nursing homes; ambulatory-care centers; mental-health facilities; rehabilitation centers; and local, State, and Federal agencies.

Administrators are also employed by private insurance firms, group-practice plans, health-planning boards, health-management firms, educational institutions, health-research programs, and voluntary health agencies.

Health administrators generally work standard office hours, but working time can be increased substantially

by attendance at weekend or evening meetings, seminars, and professional conferences. In the event of disasters, such as fires and floods, administrators in health-care facilities are responsible for coordinating medical services to those in need.

Some individuals entering the field of health administration choose their area of specialization according to management function, such as financial planning, personnel administration, or employee relations. Others base their career choices on the type of organization, such as hospital, nursing home, or voluntary health agency. Each of these specialties is discussed in detail in the following paragraphs.

Hospital administrators, whether in small or large facilities, take overall charge of the institution and coordinate all of its services. Administrators see that all of the hospital's objectives are carried out and are directly responsible to the hospital's governing body. Administrators are responsible for developing an effective team of physicians, nurses, dietitians, pharmacists, housekeepers, engineers, and others who work in the hospital and for seeing that adequate supporting facilities, services, and equipment are available. They are responsible to the community and are obligated to see that the hospital provides an acceptable health-services program.

Administrators must be well informed about all hospital functions and services and equipped to select and supervise the staff members who are in charge of all its departments. They must be aware of community health needs and health planning. They are concerned not only with the professional services needed to provide patient-care services but also with those required for business and office operations, personnel management, public relations, volunteer services, purchasing, engineering and maintenance, and housekeeping.

Administrators must be able to cope with the special situations and emergencies which arise daily in every hospital and must be prepared to handle unexpected demands practically around the clock. Administrators may have one or more assistants. Assistants frequently carry on special studies and prepare reports to help administrators make final decisions or recommendations to the governing board. The man or woman who wants to become a hospital administrator needs the basic capacities required for administrative work in any field. He or she should also have good health, vitality, the ability to work under pressure, and a sincere interest in hospital work.

The nursing home administrator, also known as a long-term care administrator, is the chief executive of

the facility and is responsible for directing and coordinating activities according to established policies and regulations. The administrator functions under the general supervision of a proprietor or a board of trustees, and is responsible for the overall management of the facility and for the implementation of policies set down by the governing board. To set the tone of the nursing home, the administrator should possess strong management skills, personal warmth, and a sensitivity to the needs of the elderly and infirm. The primary concern of the administrator is providing quality patient care and making certain that staff members have the facilities, equipment, and support necessary to meet this goal. Administrators devise plans of service and coordinate the work of all staff directly or through supervisory personnel.

Generally, administrators devote the greatest portion of their time to developing programs, preparing budgets, and formulating operating procedures for the facility. Since nursing homes vary in size and type of service provided, there are significant differences in administrators' basic duties. For example, in most large facilities the administrator usually delegates responsibility for daily operations to assistant administrators or to the various department heads. Assistant administrators oversee the operating departments and keep administrators informed through written reports and regular meetings. In smaller nursing homes, on the other hand, the administrator is more actively involved with all functions and levels of operations, including managing departments, hiring workers and supervising their training, and interviewing the families of persons

seeking admittance to the home. The administrator also insures that the facility is in compliance with the law and acts upon reports of government inspection teams.

Whether the facility is large or small, administrators spend a great deal of time in meetings. They meet with board members, representatives of government, and community health and welfare agency staff to discuss matters of mutual concern. They are constantly in touch with third-party groups such as Medicare or Medicaid that pay patients' bills and have frequent contacts with with insurance companies and Federal and State agencies. In addition, nursing home administrators are often called upon to speak at public gatherings before civic and other interested groups.

Generally, nursing home administrators are not clinical health professionals, but they must develop a thorough knowledge of the overall health care delivery system. In addition, they should be thoroughly familiar with the physical and mental aspects of aging and with the basic concepts of rehabilitative health care. All of this is necessary since nursing home patients, unlike hospital patients, tend to remain in the health facility for long periods, and their social needs must be met by the administrator. The man or woman considering this career must relate easily to all types of people, have good communication skills, and have the potential to develop the management skills necessary to deal with complex problems.

Another example of specialization in this field is the administrator or executive director in a voluntary health agency. These agencies are nonprofit organizations whose funds are obtained mainly through contributions from the general public. They usually specialize in specific diseases or related services, and they provide services to individuals and communities and also engage in research and education programs. Many agencies are national in scope, with some State or local affiliates, and the responsibilities of administrators vary with the size of the unit.

Administrators or executive directors work closely with the agency's board of directors, a group of community leaders who serve as volunteers, and together they set the course of the agency's activities, develop the program, organize citizen committees, and approve staffing plans. Knowing that the only basis for a practical and effective program is accurate local information, administrators keep themselves and the community up to date with regard to the health programs with which the agency is concerned and the community's resources for conducting them.

They utilize all of the guidance and resources the agency's national organization offers, in order to strengthen the local unit and make it an effective member of the community health partnership. They work closely with comprehensive health planning organizations and other agencies in the community to help bring together their various services without overlapping or duplication. Administrators actively participate in all kinds of community and neighborhood activities—civic, church, labor, government, farm organization. Other responsibilities include developing a budget for consideration by the agency's board or tend the agency's service to more people and are sources of community support.

The administrator or executive director helps supervise recruitment, selection, and training of volunteer workers and usually takes responsibility for local fundraising within the policies of the national organization. Other responsibilities include developing a budget for consideration by the agency's board or finance committee; administering the agency's funds; and carrying out personnel functions such as recruiting, hiring, training, and supervising of staff. Administrators or executive directors employed in small local agencies are often required to have additional specialized skills, such as nursing, fundraising, or health education. Persons considering this career should be able to deal tactfully and effectively with all kinds of people, have an interest in staying abreast of health-care developments, and have the potential to develop the management skills that this work demands.

## Job Requirements

The most widely recognized professional preparation for health services administration is the master's degree. Graduate degrees awarded are usually the MHA (Master of Health Administration) or the MPH (Master of Public Health). The Master's Degree in Business Administration (MBA) may also be acceptable for certain kinds of administrative positions.

Most full-time MHA/MPH programs consist of from 1½ to 2 years of academic course work. Some may include or be followed by an internship or residency in a health facility or organization where the student receives supervised work experience.

Undergraduate degrees in health administration are a new development. Most of these programs have been operating only since the early 1970's. Only a few bachelor degree programs maintain a full-time faculty. Many are less developed, consisting of one full-time faculty member or part-time faculty only. The newness of these undergraduate programs makes it difficult to

predict what such a degree will mean in the job market.

Bachelor programs may prepare students for entry level administrative positions. However, the master's degree is usually the necessary credential for most job opportunities and advancement within this field. A doctoral degree in health administration is desirable for teaching and research positions.

There are no uniform educational standards for nursing home or long-term care administrators, and requirements vary widely from State to State. However, increasing numbers of people are preparing for this career by completing college programs in long-term care administration. These programs, leading to associate, bachelor's, or master's degrees, are in such fields as health-care administration and gerontology, with emphasis on long-term care administration.

As a rule, licensure is not required for executive positions in most areas of health services administration, with the exception of nursing home or long-term care administration. All States and the District of Columbia require these administrators to pass a qualifying licensing examination, and most students prepare for it by completing a special course of study. This course, usually consisting of 100 to 200 hours of study in long-term care administration, is available through some colleges, universities, and home study programs. The licensing examination covers principles of administration; management of a long-term care facility; the role of government in long-term care; environmental health and safety; and medical, psychological, and social aspects of patient care. Nearly half the States require these applicants to complete an internship commonly known as an Administrator-in-Training (AIT) program before they take the licensing examination. Similar in intent to the residency requirement for hospital administrators, the internship of the nursing home administrator generally lasts 1 year and is supervised by a licensed administrator or "preceptor." The internship may be offered as part of a formal academic program in long-term care administration or may be arranged between the intern and a nursing home administrator.

Since these requirements vary from State to State, persons contemplating a career in nursing home or long-term care administration are urged to contact their State licensing agency for exact details.

## Opportunities

Overall, the employment prospects of health services administrators are expected to increase in the next several years as the availability of patient services expands and health-management problems become more complex. However, because of the rapid expansion in the number of professional training programs in this field, substantial competition for available openings is anticipated and individuals with advanced degrees should find greater employment opportunities in this field as employers become more selective.

Rapid growth is expected in the number of licensed nursing home administrators needed through the next decade. This outlook is based on an anticipated expansion of the industry as a whole and on increases in the average size of nursing homes.

Administrators who develop the requisite skills through experience and education may advance to higher level management positions within one specific organization or may do so in other institutions which offer positions with increasing levels of responsibility. In general, advancement prospects are governed by the size and type of the organization, as well as its management structure.

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| DOT Code: | | |
|---|---|---|
| | Administrator, Hospital | 187.117-010 |
| | Director, Community Organization | 181.117-014 |
| | Director, Home-For-Aged | 187.117-018 |

For further information, contact:

American College of Hospital Administrators

American College of Nursing Home Administrators

Association of University Programs in Health Administration

American Academy of Health Administration

Association of Medical Rehabilitation Directors and Coordinators

Association of Schools of Public Health

# Medical Secretary

Medical secretaries work in private medical offices, group practices, hospitals, clinics, and other health facilities. Their responsibilities are limited to administrative and clerical duties, and they are not trained to assist physicians with clinical or laboratory tasks. Medical secretaries are primarily responsible for the orderly, efficient operation of the office. Typical duties include keeping individual medical records, taking simple medical histories, filling out insurance forms, and billing patients for medical services. They also schedule appointments for patients, arrange for patients to be hospitalized, handle telephone inquiries, and act as receptionist for incoming patients. Medical secretaries take dictation and type correspondence, reports, and

manuscripts. In certain cases, they also do bookkeeping, prepare financial records, and handle credit and collections for their employer.

Medical secretaries generally work in pleasant surroundings in modern medical offices. Their work is often performed under pressure and requires patience and tact at all times in dealing with patients.

## Job Requirements

Persons considering this career should be high school graduates or the equivalent, preferably with courses in English, biology, and typing. A sound knowledge of spelling, punctuation, grammar, and vocabulary are also important. One or 2-year programs in secretarial science, with a medical option, are given by accredited vocational schools and junior or community colleges. Graduates of 1-year programs receive a certificate; those in 2-year programs are awarded the Associate in Applied Science degree. While post high school education is not required for all beginning jobs in this field, it may be helpful in gaining initial employment and for job advancement.

In some cases, persons with secretarial experience in other fields prepare for this career by taking medical terminology and related courses as part of a continuing education program. There are no licensing requirements for this work. However, many medical secretaries apply on a voluntary basis for certification. By passing a series of examinations administered by this association, the medical secretary is given the designation Certified Professional Secretary (CPS). This designation is regarded by many employers as a mark of competency in this field.

## Opportunities

Employment prospects for qualified medical secretaries are expected to be quite favorable through the next decade. This outlook is based on increased public demand for health services; the expansion of medical facilities, health-maintenance organizations, and group medical practices; and broader insurance coverage by government-sponsored and private health-insurance plans. Qualified medical secretaries can advance to such positions as administrative assistant or office manager.

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DOT Code: Medical Secretary 201.362-014

For further information, contact:
The National Secretaries Association

Medicine, the practice of healing, is one of the oldest professions. Whenever illness or accidents occur, physicians are sought for help. Today, along with the curative aspects of their profession, physicians must bear additional responsibilities. Keeping people well through preventive medicine, keeping informed about new drugs, advances in technology and equipment, and learning and applying new therapeutic techniques complicate the practice of modern physicians.

Heavy demands on the time of physicians have led to increasing specialization and reliance on assistants to perform the more routine medical procedures, allowing physicians more time for problems requiring the highest levels of skill and judgement.

Primary care physicians in family or general practice, pediatrics, internal medicine, or obstetrics and gynecology are generally the first physician the patient consults. They begin diagnosis and treatment of patients, maintain continuing responsibility for the care of patients, and coordinate and combine other needed health services into a total treatment plan. Depending on the specific needs of a patient, such a plan may involve one or more of the 22 major medical specialties and their subspecialties. For example, a cardiologist may be required when a heart problem exists; an orthopedist is needed to set bones and perform bone surgery; other surgeons may be involved in special or general surgery; and the services of a radiologist are often needed for diagnosis by X-ray or for radiation treatment of cancer patients.

Podiatrists and podiatric assistants also belong in the field of medicine. Podiatrists, professionally trained foot-care practitioners, diagnose, prevent, and treat foot problems medically or surgically and consult with other medical specialists on problems requiring further medical treatment.

Physicians depend on physician assistants to conduct routine time-consuming medical examinations and duties and on medical assistants to take care of equipment, prepare patients for examination, and perform a variety of clerical work needed to keep a medical office running smoothly.

Physicians also rely on emergency medical technicians to care for patients when emergencies occur outside of the medical office. These technicians often rescue persons from dangerous situations and give emergency medical care at the scene and enroute to the hospital and a physician's care.

The careers of physicians (in general or specialized medical and osteopathic practice) physician assistants, medical assistants, chiropractors, podiatrists, podiatric assistants, and emergency medical technicians are discussed in detail in the following pages.

## Chiropractor

**Chiropractic physician**
**Doctor of chiropractic**

The first responsibility of the chiropractor is to make an accurate diagnosis of the patient's health problem. This is done by interviewing the patient, physical examination, X-ray examination, and laboratory tests. Because of the emphasis on the spine and its position in chiropractics, most chiropractors use X-ray extensively to locate the source of difficulty. The patient is then treated or referred to another health practitioner if it is felt that further diagnosis or treatment beyond the scope of chiropractic, such as surgery or psychiatry, is indicated. Chiropractic treatment consists primarily of chiropractic adjustment—the manipulation of the body, especially the spinal column. Some chiropractors use such supplementary measures as water, light, and heat treatment, or prescribed diet, exercise and rest. Most State laws restrict the type of supplementary treatment permitted. No State permits the use of prescription drugs or surgery as part of chiropractic treatment.

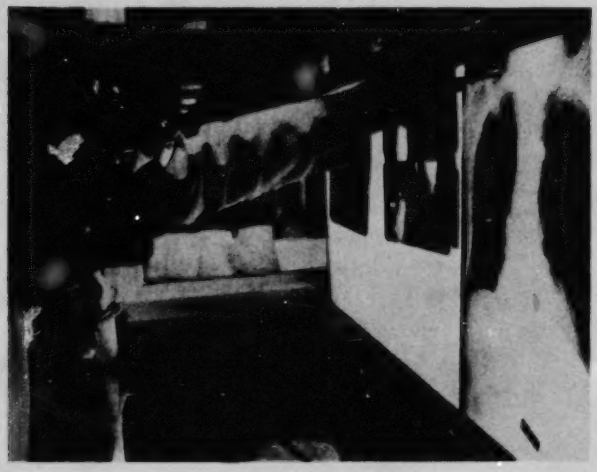
Most chiropractors are self-employed and conduct a general practice; however, there are two areas of specialization: the chiropractic roentgenologist, who specializes in the taking, processing, and interpreting diagnostic X-ray films; and the chiropractic orthopedist, who specializes in the prevention of skeletal deformities. Chiropractors also teach at chiropractice colleges, either exclusively or in addition to their regular practices, and engage in professional research.

### Job Requirements

Individuals interested in a career in this profession should start preparing early by taking science-related courses in high school. The actual program consists of 6 years of academic training. This begins with a 2-year preprofessional curriculum which must be completed prior to admission to a chiropractic college. The professional chiropractic curriculum consists of a minimum of 4 academic years of professional study. The major part of the first 2 years of professional chiropractic study is devoted to courses in anatomy, biochemistry, microbiology, pathology, public health, diagnosis, clinical disciplines, related health sciences, and chiropratic principles and practices. The remaining 2 years are devoted to practical or clinical studies, under

strict supervision, dealing with diagnosis and treatment of disease. Approximately half of the time is spent in the clinic.

All States require a license to practice chiropractic. The licensing examination, which is given by the examining board of the State in which a person wishes to practice, must be taken after the chiropractic student has completed his or her formal education. There is also a National Board whose examination is recognized as a measure for licensure in 44 States. Approximately 90 percent of all chiropractic students sit for the National Board examinations as a mandatory requirement for graduation. Special continuing education courses for practicing Doctors of Chiropractic are not only encouraged but mandatory in the majority of States.



## Opportunities

Opportunities for chiropractors are expected to increase with wider public acceptance of chiropractic treatment and with coverage for chiropractic services now available under most health insurance, Medicare, Medicaid and State workmen's compensation programs. Opportunities will be created by both the increased demand and the need to replace those who die, retire, or leave the occupation. Since most chiropractors are self-employed, their advancement within the field is usually centered around building a practice or establishing a chiropractic clinic. For some, specialization, research, or teaching offer an avenue of advancement.

DOT Code: Chiropractor 079.101-010

For further information, contact:
American Chiropractic Association

# Emergency Medical Technician

### Paramedic

Emergency Medical Technicians (EMT's) respond to medical emergencies and provide immediate care to the critically ill and injured. They determine the nature and extent of illness and injury and decide the sequence of different emergency medical treatments. They may control bleeding; treat shock; apply splints to broken bones; assist in childbirth; control or restrain emotionally disturbed patients; or take care of victims of poison, burns, or heart attacks.

On arrival at the scene of an accident, EMTs may have to free trapped victims and, in the absence of police, get bystanders to aid in rescue efforts.

There are 3 ratings for the EMT: EMT—(Non-Ambulance), EMT—Ambulance, and EMT—Paramedic. EMT's—(Non-Ambulance) generally work as patient or health care personnel such as nurses, nurses' aides or orderlies, or as law enforcement and industrial safety personnel. EMTs—Ambulance serve on emergency medical ambulances or with rescue or military field services. EMTs—Ambulance with additional training may advance to the EMT—Paramedic.The EMT—Paramedic may give drugs intravenously (through the vein) or use an electrical device (defibrillator) to shock a stopped heart into action. The EMT—Paramedic usually works on mobile intensive care vehicles, under a physician's direction, through voice contact (radio or telephone) from the medical center.

Good health and muscle coordination are important as these workers must lift and carry patients, climb to high places, or rescue trapped victims. Ability to give and receive spoken and written instructions and to inspire confidence in patients, good judgement in stress situations, and emotional stability are other required characteristics.

## Job Requirements

To become registered as an Emergency Medical Technician, a person must be at least 18 years of age, be a high school graduate or equivalent, and complete an 81-hour course in emergency medical care approved by the U.S. Department of Transportation (DOT). In addition, 3 months of patient or health care experience is required for EMT—(Non-Ambulance); 6 months emergency ambulance or rescue service for those registered as EMT—Ambulance. This certification award must be renewed every 2 years. These programs

are given by hospitals; community colleges; and fire, health, and police departments.

To become an EMT—Paramedic, a person must first become registered as an EMT—Ambulance and then successfully complete an EMT—Paramedic training program which meets the national standards as recommended by the U.S. Emergency Medical Services Interagency Committee. These programs range from 64 to 1200 hours and are offered in universities, medical schools, junior colleges, hospitals, or other State educational facilities. Following this training and 6 months field experience as an EMT—Paramedic, candidates may sit for a written and practical examination by the National Registry of Emergency Medical Technicians.

## Opportunities

Employment opportunities are limited. Currently, 65 percent of all EMTs serve on voluntary, emergency, or rescue services or are employed primarily as fire, police or safety health personnel. Some job opportunities exist on private or municipal ambulance services. As communities become more aware of the need and value of emergency medical services, paid employment opportunities should increase.

DOT Code: Ambulance Attendant 355.374-010

For further information, contact:
National Registry of Emergency Medical Technicians
Your State Office of Emergency Medical Services (under the jurisdiction of State Dept. of Health, Public Health or Transportation and Safety)

# Medical Assistant

**Medical aide**
**Medical office assistant**

Medical assistants are usually employed in physicians' offices, where they perform a variety of both routine clinical and clerical duties. All assistants have the same job title, but their responsibilities vary depending on whether they work in a small one-employee private office, large group practice with other assistants, clinic or hospital, or research laboratory. In all cases, the assistant is supervised by a physician and performs tasks as required, in accordance with State laws.

When performing clinical duties, medical assistants may sterilize instruments and check diagnostic equipment for good working order. They may prepare patients for examination or treatment, take temperatures, measure height and weight, perform routine urinalyses or simple blood tests, collect blood samples, or administer electrocardiograms. They may also stand by to assist the physician during patient examinations, treatments, minor surgery, and emergencies. They also give information to patients about preparation necessary for tests, X-rays, and laboratory examinations.

Medical assistants may perform a wide range of clerical duties which help to keep the medical office running smoothly. They answer phones; greet patients and other callers; handle mail; record, correct, review, and file patient data and medical histories; and arrange for hospital admission and laboratory services. Checking and ordering office and medical supplies and dealing with agents of pharmaceutical firms and other medical suppliers may be part of a day's work, along with office recordkeeping. In addition, this assistant may take, transcribe, and type dictation and type correspondence and reports.

Accuracy, dependability, a courteous pleasant manner, patience, and a respect for the confidential nature of medical information are necessary traits for these workers, who have a great deal of daily public contact. They spend considerable time working at desks, but clinical duties require them to be able to stand, kneel, and do moderate lifting when working with patients.

They also may be exposed to some chemical odors when working in this area.

The average work week is about 35 hours in length, but hours may also be irregular, depending upon the physician's schedule.

Medical assistants may specialize in pediatrics (child health care) working under the direct supervision of a pediatrician. They may also choose to specialize in the field of opthalmology and be trained to gather patient histories (as they relate to eye problems) following a prescribed format and perform certain eye-function measurement testing under the supervision of an ophthalmologist. At no time does the ophthalmic medical assistant make any decisions which require independent clinical judgment or interpretation of test results. Medical assistants may also work for physicians in other areas of specialty and receive additional training from them.

## Job Requirements

Candidates for post-secondary schools offering accredited programs in medical assisting must have a high school diploma or the equivalent. Useful high school courses for careers in this field include: biology, chemistry, first aid, nutrition, math, business English, shorthand, bookkeeping, and office practice.

There are several ways to become a medical assistant. Students can complete medical assistant training at a privately owned school officially approved by the Accrediting Bureau of Medical Laboratory Schools, an independent accrediting agency of the American Medical Technologists (AMT).

Many junior and community colleges offer an Associate of Arts degree in Medical Assisting. This 1- to 2-year program must be accredited by an area Association of Schools and Colleges (recognized by the U. S. Office of Education) for a graduate to be eligible for AMT certification.

Program accreditation for 1- and 2-year medical assistant training is also offered by the American Association of Medical Assistants in collaboration with the American Medical Association's Committee on Allied Health Education and Accreditation. The 1-year course is usually available in colleges, vocational, technical, or privately owned schools, which give a certificate on successful completion of studies. The 2-year courses are offered in community or junior colleges which award an associate degree to graduates.

The basic content of both programs must include the following classroom and clinical areas of study: anatomy and physiology; medical terminology; medical law and ethics; psychology; communications; administrative procedures, such as office procedures, correspondence and typing; medical dictation and transcription; bookkeeping and insurance; clinical procedures including sterile and examination-room techniques, laboratory procedures, principles of pharmacology and drug administration, diagnostic-machine orientation; and externship. Candidates for medical assistant programs of study must submit evidence of good health, including the results of a tuberculin-screening test, or chest X-ray.

There are no licensing requirements for medical assistants. However, professional certification or registration may be required by some physicians for employment. This is offered by two organizations on successful completion of an examination given to those who qualify. American Medical Technologists offer the RMA (Registered Medical Assistant) credential; the American Association of Medical Assistants (AAMA) offers the CMA (Certified Medical Assistant. In addition, AAMA makes available several types of certification to persons who have completed specialized training or acquired knowledge in specific areas. Candidates may earn specialty certification through the AAMA in administrative (CMA-A) and clinical (CMA-C) categories. Certification has also been offered to pediatric medical assistants (CMA-Ped), but this examination was not given in 1978. This suspension was evaluated for 1979. Both organizations offer opportunities for continuing education.

## Opportunities

Employment opportunities should steadily increase in the next few years due to a growing population, new laws providing more health-care services, greater availability of pre-paid insurance plans, and public awareness of the need for good health maintenance. Medical assistants will be needed to assume responsibility for physicians' record and bookkeeping activities as well as to help the physicians with routine medically oriented duties.

Medical assistants can improve their chances for advancement by increasing their job-related skills and knowledge through experience and continuing education. Workshops, seminars, and home-study courses, or study of allied health subjects in selected post-secondary schools are the best ways to achieve promotion.

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DOT Code: Medical Assistant 079.367-010

For further information, contact:
American Association of Medical Assistants
American Medical Technologists

## Operating Room Technician

**Certified operating room technician**
**Surgical technician**

Operating room technicians work under the direction of the operating room supervisor, who is usually a registered nurse. Technicians work as a part of the surgical team. They prepare rooms, equipment, and supplies for use during surgery. They also assist the surgical team by cutting stitches, holding instruments, and by supplying sterile materials as needed.

Depending on where they work, their duties vary, but may include any of the following: They may prepare patients for surgery; clean rooms; sterilize instruments; prepare supplies and equipment; order supplies; restock rooms, carts, and cabinets; and keep records. The technician may assist in the operating room by passing instruments and supplies to the surgeon; counting sponges, needles, or instruments used; getting rid of used materials; or handling specimens. They may weigh blood-soaked sheets, towels, and sponges to determine the amount of blood loss.

Operating room technicians must respond quickly and accurately to requests, be able to work smoothly with others, have skillful hands, and be able to stand all day. The normal workweek is 40 hours in length, but technicians may have to be "on call" for emergencies.

Operating room technicians work in hospital delivery and emergency rooms as well as in operating rooms. They may work as private assistants or have an independent arrangement with 6 to 12 surgeons.

### Job Requirements

High school graduation or equivalency is required. Programs combining 9 months to 2 years of classroom and clinical training may be given by accredited vocational-technical schools, junior and senior colleges, and universities with clinical affiliations. Medical schools, hospitals, and clinics also provide training for this occupation. A graduate of a 2-year program receives an associate A.A. degree. The American Medical Association's Committee on Allied Health Education and Accreditation accredits programs for the operating room technician.

Students in these programs receive education and

training in basic sciences such as anatomy, physiology, pathology, and microbiology; operating room techniques including sterilization measures; and transporting and preparing patients for surgery. These students also learn about some of the procedures used in various types of surgery.

Most hospitals require certification for employment. When not required, certification is preferred, however, because it shows that the person has broad general knowledge, the ability to apply it properly, and can adjust to required duties of almost any operating room. To become a certified operating room technician (CORT), the candidate must take and pass a national examination.

With additional training and experience, operating room technicians may advance to operating room assistant, operating room supervisor, unit manager, purchasing agent, or operating room instructor.

### Opportunities

The need for these workers should double in the next 10 years. Growth in the population and greater ability of people to pay for surgery through prepaid medical plans will help to increase demand for operating room technicians.

DOT Code: Surgical Technician 079.374-022

For further information, contact:
Association of Operating Room Technicians

## Physician

### Doctor

The physician is responsible for diagnosis; treatment; and prevention of human disease, injury, or other physical or mental conditions.

There are two types of physicians: the MD--Doctor of Medicine—and the DO—Doctor of Osteopathy. Both MD's and DO's use all accepted methods of treatment. Osteopathic physicians, however, believe that the proper functioning of the musculoskeletal (muscle-bone) system is integral to the maintenance of an individual's overall health. Using their hands, DO's correct disorders of this system or they may prescribe surgery, diet, or medicine, if necessary.

In order to determine the presence, extent, or absence of illness or injury, the physician must be a skilled listener and observer. Taking a history of the patient's past and present health problems; listening for abnormal sounds, as in the lungs; manually examining different parts of the body for swelling or other abnormalities; and performing various tests are all part of the physician's examination. The physician may order laboratory tests of a patient's blood or other body specimens or X-rays as part of the examination. Once the physician has gathered, organized, and analyzed all the information about the patient, he or she must decide on a diagnosis and treatment. Treatment may include prescribing medication, surgery, special diets, or exercise. The physician may personally give the treatment or may supervise trained health personnel who will administer the treatment, as prescribed. Counseling patients on their health problems and habits may also be part of the physician's work.

The physician who maintains overall responsibility for the patient's care and who coordinates and integrates other health services needed into a total treatment plan is known as the primary care physician. A primary care physician may treat a patient in the office or hospital, by the road side, in an emergency-service helicopter, anywhere. A physician in this category is usually in family practice, pediatrics, internal medicine, or obstetrics and gynecology.

Physicians work wherever there are health facilities and people needing medical assistance. The majority are self-employed and work alone or in group practices. Federal and non-Federal hospitals, including their clinics and ambulatory-care facilities, constitute the next largest employer. Physicians may also be employed by health-maintenance organizations, nursing homes, public-health agencies, research institutes, student-health services, and private industry.

The nature of physicians' work usually requires them to work closely with other people, whether it is with patients, patients' families, other physicians, or other health personnel. Work hours are frequently long; a 55-hour or more work-week is not uncommon. Because they are called on to treat sudden illness and emergencies, their work hours are often irregular. Many physicians in private or group practice must travel frequently between office and hospital to care for their patients. Generally, there are no specific physical requirements for successful job performance but certain specialty areas may make special physical demands. For example, surgeons stand for long periods while performing operations and pathologists spend many hours each day examining slides of microscopic specimens.

Both MD's and DO's may specialize in a particular area of medicine. There are 22 major specialty areas and their subspecialties from which an MD may choose. DO's may specialize in any one of 16 specialty areas or their subspecialties, although the majority choose general practice or another primary care area.

Anesthesiologists use a variety of gases and drugs to keep patients insensible to pain and as comfortable and safe as possible during surgery and other medical procedures. This specialist must keep the patient's airway opened and inform the surgeon of any complications.

Cardiologists examine patients with symptoms of heart disorders, using electrocardiographs, X-rays, and a variety of laboratory methods and equipment. They treat patients medically rather than surgically.

Dermatologists tend more toward medical and physical than surgical methods of treatment. They diagnose and treat such skin conditions as acne, psoriasis, and skin cancer.

Endocrinologists treat problems arising from malfunctions of certain types of glands which secrete substances (hormones) directly into the bloodstream. These hormones, depending on their type, can affect physical and mental well-being. Hormones controlling growth are examples of endocrine secretions.

Family practitioners are specialists who provide comprehensive continuing medical services for family members regardless of age or sex.

Internists diagnose and medically treat diseases and injuries of internal-organ systems.

Neurologists medically treat disorders and diseases of the nervous system, such as cerebral palsy and epilepsy. Many also specialize in psychiatry.

Obstetricians care for pregnant women before, during, and after birth and perform surgical procedures needed to preserve the patients' health and deliver infants safely. The gynecologist diagnoses and treats diseases and disorders of female genital, urinary, and rectal organs and performs surgery as needed to correct malfunctions or to remove diseased organs. Some physicians specialize in both obstetrics and gynecology.

Ophthalmologists may use either medical or surgical procedures in treating diseases or conditions of the eye. They perform various tests to determine amount of vision loss, prescribe medications, write prescriptions for corrective lenses, and perform surgery (e.g., cataract removal), when necessary.

Orthopedists, also known as orthopedic surgeons, treat broken bones, back problems, or joint diseases. They treat patients both surgically and medically, frequently using appliances such as casts and braces. They may also prescribe special exercises as remedies for various problems.

Otolaryngologists (ear, nose, and throat specialists) treat chronic and acute disorders of the ear, nose, and throat, either medically or surgically. Tonsillectomies, operations to restore hearing, and treatments for sinus conditions are a few examples of work in this specialty.

Pathologists perform and evaluate various laboratory tests, including tests of tissue taken from patients, to determine cause of illness or death. Of all the specialties, the work of the pathologist may be least known to laymen, since it is usually performed away from the patient's presence. Pathologists often confine their work to a specific area, such as chemistry, microbiology, hematology, or blood banking.

Pediatricians are concerned with the practice of medicine as it relates to children from birth to adolescence.

Physiatrists are specialists in physical medicine and rehabilitation. They are responsible for helping patients injured or deformed by accident, disease, or birth defects to walk, work, and live more normal lives through use of exercises and treatment dependent on physical agents such as heat, light, or cold. Proctologists diagnose and treat diseases of the anus, rectum, and colon, either surgically or medically.

Psychiatrists treat such emotional disorders as anxiety and depression, as well as more serious disorders in which the patient has lost contact with reality. Psychiatrists who limit their practice to children are known as child psychiatrists.

Radiologists interpret X-ray films; they may specialize in use of X-rays for diagnosis or may prescribe and use substances such as radioactive iodine, cobalt, or gold to find and treat malignant tumors.

Urologists treat the urinary systems of both men and women and the reproductive organs of men. (The

gynecologist treats the reproductive organs of women.) The specialist in urology may perform surgery to relieve such problems as kidney stones or enlargement of the prostate gland. However, many conditions requiring this specialist's attention can be treated medically, for example, bladder infections.

Surgeons belong to one of the best known branches of medical practice, partly due to frequent demand for surgical services. The largest of the surgical specialties is general surgery. This physician performs a wide variety of surgical procedures such as gallbladder or apprendix removal and hernia repair. Other surgeons limit surgical practice to a single specialty:

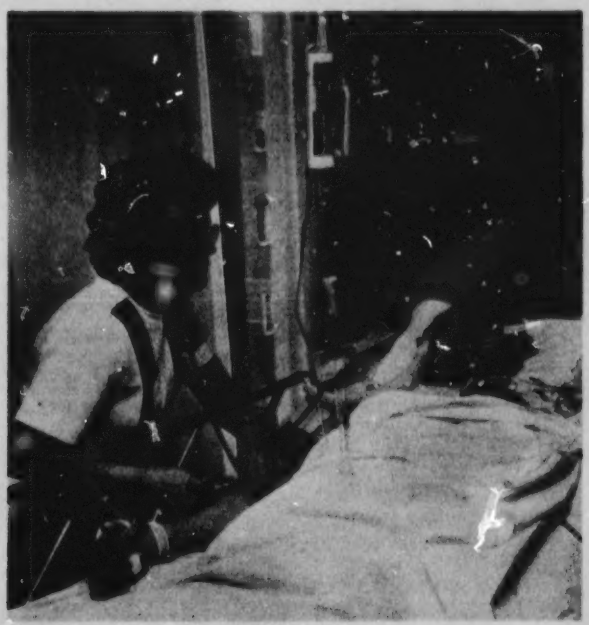
Neurosurgeons perform surgery on the brain and on the delicate nerve networks of the human body, as distinct from neurologists, whose work is limited to medical treatment of the nervous system.

Plastic surgeons repair or improve function and appearance of facial or other body parts which may be missing or injured as a result of accidents or birth defects.

Thoracic surgeons perform chest surgery such as lung surgery for cancer and heart transplants.

Although there is a certain amount of glamour and drama associated with the physician's career, accomplishments are more accurately measured by hard, patient work, endless attention to detail, and willingness to perform various unpleasant tasks that are part of the profession.

Not everyone is cut out to be a physician. It is fair to say that no profession requires a more exacting combination of strength—mental, physical, and emotional.



Anyone interested in a medical career must have a great capacity for learning. Being a good student is important because medical training is long and the courses are difficult and because being a good physician means a lifetime of constant learning.

The candidate for medical school needs to do well in science. Exceptional intellectual curiosity, initiative, judgment, and perseverance are needed to carry the medical student through years of rigorous training.

Good health is also important. A medical student needs enough physical stamina to take on 5 or more years of intensive study and clinical work after college. Especially during the early years of practice, the physician is required to be on call 24 hours a day.

Finally, the would-be physician should have the emotional stability that the practice of medicine demands. A good physician not only likes people and genuinely wants to serve them but is also prepared to express this concern in difficult decisions which must be made with objective judgment.

## Job Requirements

Medical training takes at least 8 years after graduation from high school, and may require from 10 to 15 years for those who want to specialize. Basic education is the same for all physicians, regardless of later specialization.

The first step toward a medical education is taken in high school with an academic program including math, science, English, speech, and social studies to prepare the student for college entrance. The school chosen should be an accredited college or university with high academic standards. As in high school, courses should emphasize science and also include English, physics, basic calculus, biology, inorganic and organic chemistry, social studies, and one or two languages. High grades are extremely important, since there are many more qualified applicants for medical school than there are places to accommodate them.

Specific admission requirements and other information are available through admissions offices of individual medical or osteopathic schools. A yearly publication of the Association of American Medical Colleges, "Medical School Admission Requirements: U.S.A. and Canada," is available for students who wish to prepare for an MD degree. Generally, the minimum entrance requirement for medical and osteopathic schools is 3 years of college, but most students have bachelor's degrees. In addition, every premedical student should take a preadmissions test-MCAAP

(Medical College Admission Assessment Program) given under the sponsorship of the Association of American Medical Colleges—about 1½ years before applying to medical or osteopathic school. The test is given twice a year at centers across the country. Medical and osteopathic school programs are 3 to 4 years in length, depending upon the availability of an accelerated program which involves 3 years of school attendance with no summer vacations.

Anatomy, pharmacology, biochemistry, physiology, microbiology, and pathology are some of the basic science courses which were formerly taught in laboratories and classrooms during the first 2 years, followed by 2 years of clinical teaching, when the student began to work with patients and learned to apply basic medical knowledge to solving clinical problems. This division between basic sciences and clinical subjects, such as pediatrics, radiology, obstetrics-gynecology, and internal medicine still exists, but, increasingly, firsthand experience with patients is coordinated with the learning of basic sciences. In addition, the curriculum for osteopathic physicians also deals with instruction in osteopathic principles and training in diagnosis and correction of disorders of the muscle-bone system through use of the hands.

After graduation, doctors of osteopathy complete 1 year of a rotating hospital internship. Additional training is needed to specialize. Instead of internship, most MD graduates now go into specialty training, known as a residency, which can last from 3 to 6 or 7 years. Internal medicine, for instance, requires 3 years, general surgery 5 years, while specialization in child neurology needs 5 or 6 years to complete.

All States require a license to practice medicine. A licensing examination given by a State licensing board is taken by all new physicians after completion of 1 year of

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graduate medical education (internship for DO's and residency for MD's). Each board sets its own requirements and issues a license for use in that State alone. In most States, doctors of osteopathy take the same licensing exam before the same board as doctors of medicine. In all States, licensing allows DO's to provide the same range of professional services as MD's. For those who wish to be certified in a specialty, there is an additional written and oral examination given by each specialty board following completion of appropriate training for the specialty.

All MD's are strongly encouraged to continue their education through special courses which are offered at hospitals, medical schools, and other places throughout the country. DO's are required by their professional association to complete at least 150 credit hours of approved continuing medical education every 3 years, as long as they remain in active practice. Some States also have continuing medical education requirements for relicensure.

## Opportunities

Advancement usually takes the form of a growing practice. Joining established practices or specialization offer other forms of advancement. Some physicians advance from attending physician status at a hospital to "Chief of Service" or from assistant to full professorship at a medical school or osteopathic college. In the armed forces, advancement consists of promotion in rank.

The increased output of medical school and osteopathic school graduates and leveling population growth is not expected to have a serious effect on the demand for physicians' services. Though the overall employment outlook for physicians is excellent, the need for specific types of physicians and areas of employment is changing. There is an increasing demand for, and emphasis on, the primary-care physician. Rural and inner-city areas will continue to have the greatest demand for physicians. As physicians, especially those in specialty practices, locate in large numbers in major urban areas, the job market in these areas will tighten. With increasing medical advances and technological changes, there will be a greater delegation of specific patient tasks by the physician to other trained personnel.

Physicians entering medicine, now and in the future, will find opportunity in several fascinating fields which are coming of age. They are: preventive medicine, aerospace medicine, occupational medicine, and public health.

| DOT Code: | | |
|---|---|---|
| | Anesthesiologist | 070.101-010 |
| | Dermatologist | 070.101-018 |
| | Cardiologist | 070.101-014 |
| | General Practitioner | 070.101-022 |
| | Family Practitioner | 070.101-026 |
| | Internist | 070.101-042 |
| | Neurologist | 070.101-050 |
| | Obstetrician and Gynecologist | 070.101-054 |
| | Ophthalmologist | 070.101-058 |
| | Orthopedic Surgeon | 070.101-094 |
| | Otolaryngologists | 070.101-062 |
| | Pathologist | 070.061-010 |
| | Pediatrician | 070.101-066 |
| | Physiatrist | 070.101-070 |
| | Proctologist | 070.101-086 |
| | Psychiatrist | 070.107-014 |
| | Radiologist | 070.101-090 |
| | Surgeon | 070.101-094 |
| | Neurosurgeon | 070.101-094 |
| | Plastic Surgeon | 070.101-094 |
| | Thoracic Surgeon | 070.101-094 |

For further information, contact:
American Medical Association
American Osteopathic Association
American Academy of Family Physicians
American Academy of Pediatricians
American Association of Ophthalmology
American College of Obstetricians and Gynecologists
American College of Radiology
American College of Surgeons
American Psychiatric Association
Association of American Medical Colleges

# Physician Assistant

**Community health medic**
**Physician associate**

Physician assistants are skilled health practitioners qualified through academic and clinical training to serve patients under the direction of a licensed physician. These assistants may work for a primary-care physician, that is, one who assumes overall responsibility for the patient's care and coordinates all needed health services, or for physicians who are specialists in certain fields of medicine. They are middle-level health workers with skills beyond those of the registered nurse and less than those of the licensed physician.

The physician assistant, working under the supervision and responsibility of a physician, performs routine, time-consuming medical tasks normally carried out by a physician. As a result, the physician is able to devote greater amounts of time to essential patient services.

Physician assistants interview patients, take detailed and accurate medical histories, and do routine physical

examinations. They perform or assist in routine laboratory studies, such as drawing blood, doing urinalyses, or electrocardiographic testing. Changing dressings, treating burns and common ailments, suturing (sewing) and caring for cuts and wounds, making patient rounds in the hospital and administering intravenous fluids are also important aspects of their work.

When necessary, they are expected to be able to respond correctly to life-threatening emergency situations.

Physician assistants follow up on the patient's condition, and teach and advise patients concerning medically related matters, such as treatment and diet. Review and monitoring of treatment plans and compiling and recording detailed narrative case summaries are also responsibilities of the physician assistant.

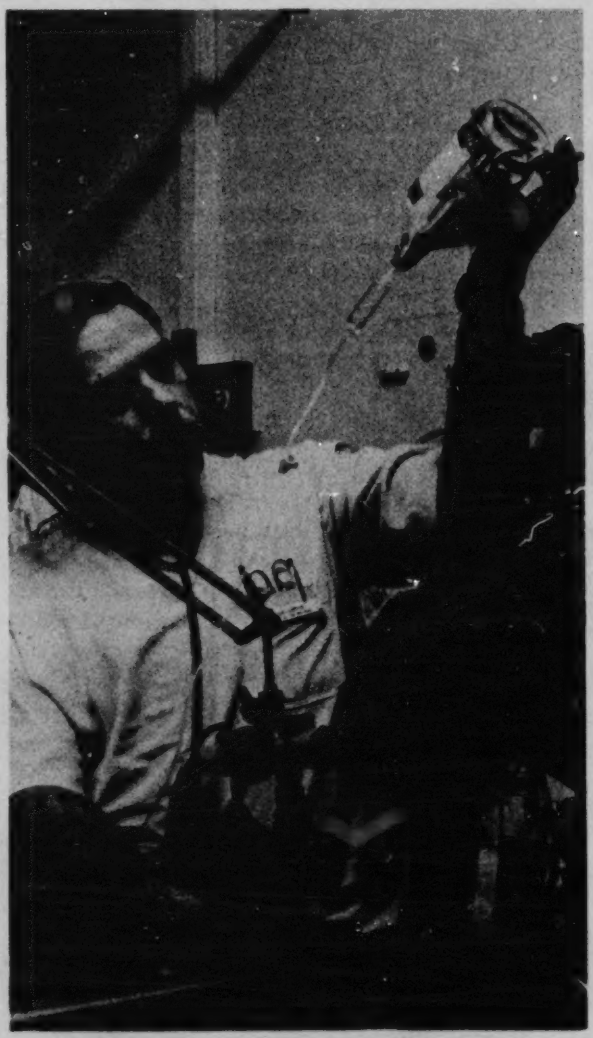
To aid the physician in referring patients to appropriate facilities, the physician assistant must also keep up to date on health facilities, agencies, and resources available in the community.

Physician assistants work in hospitals, clinics, physicians' offices, nursing homes or extended-care facilities, and health-maintenance organizations.

Since they must work closely with patients who are ill, injured, or in need of diagnostic or treatment services, physician assistants must be people-oriented and have the ability to function well in cooperation with doctors, nurses, and other professional staff. The working hours for this job often depend upon the type of facility in which the assistant is employed. The average workweek is 40 hours but may involve shift and weekend schedules, as required.

Physician assistants may work for physicians who specialize in certain fields of medicine:

- Child health associates work under the supervision of a physician, often a pediatrician. They are qualified to provide most of the diagnostic, preventive, and treatment services for children who are not hospitalized.
- Orthopedic physician assistants work under the direction of an orthopedist (orthopedic surgeon). They are qualified to provide routine in-hospital or office care to patients with orthopedic diseases, injuries, or problems. They may apply and remove simple casts and braces and traction apparatus; make minor repairs or adjustments to orthopedic devices; and care for equipment used in operating rooms, offices, or emergency rooms. Other duties can include caring for minor injuries, preparing patients for surgery, assisting the surgeon during operations and assisting patients in crutch walking or instructing them in certain types of exercises.
- Urologic physician assistants work under the direction of a urologist and are qualified to provide routine patient care. Duties can include preparing patients for examination or surgery, taking urine samples, preparing urologic instruments and equipment for use by the physician, replacing urinary drainage tubes, and performing or assisting in kidney-function testing. Urologic physician assistants may work in urologic clinics, physicians' offices, dialysis units, or operating rooms.
- Surgeon assistants work under the direction of a surgeon and are qualified to prepare patients for surgery, assist during operations, help with patients during post-operative periods, and care for minor injuries. These assistants may specialize in areas in



which the physician has interest, such as chest, or head and neck surgery or general surgery.

Surgeon assistants work in such settings as operating, recovery, or emergency rooms, and in intensive-care units.

## Job Requirements

Training institutions for this career include: medical schools; colleges, universities, junior and community colleges in affiliation with accredited teaching hospitals; Veterans Administration or U.S. Public Health Service hospitals; and the military services.

Generally, the requirements include a high school diploma and completion of up to 60 college credits (2 years of college) in a science or health professions program. Health-care work experience as a registered nurse (RN), physical therapist, medical technologist or in the military may be substituted for required education in some cases. In addition, the student must have good college-admission test scores and be able to provide several character references and evidence of good health.

Basically, there are two kinds of educational models used by most institutions. They are the university-based type, commonly lasting 2 years, and the MEDEX model. The university model consists of 9 to 12 months of basic science courses and preclinical subjects. The second year consists of structured clinical learning ranging from general family practice to psychiatry. The MEDEX system places emphasis on prior health-care work experience and combines this with a classroom science segment lasting about 6 months plus an extensive clinical preparation phase. Institutions grant associate and bachelors' degrees or certificate designation upon successful completion of the program. Students are urged to contact schools directly to obtain current information on entrance requirements and credentials awarded.

There are no nationwide uniform legal provisions for practice as a physician assistant. Currently 44 States have varying legal requirements governing the use of physician assistants; local information should be obtained from the State board of medical examiners.

Upon graduation from a program approved by AMA's Committee on Allied Health Education and Accreditation, a physician assistant, child health associate, or surgeons assistant may apply for certification by the National Commission on Certification of Physicians' Assistants (NCCPA). This organization administers a national certifying examination, which, if passed, indicates that the individual meets established standards of proficiency in primary health care delivery. Certification is renewed every 2 years and there are continuing education requirements. There are no recognized bodies offering credentials for the physician assistant specializations of orthopedic physician assistant or urologic physician assistant.

## Opportunities

There are no formal lines of promotion. However, taking advanced courses of study contributes to increasing competence and improves prospects for higher earnings.

Employment opportunities for certified physician assistants are excellent. As a rule, graduates have a number of employment options from which to choose and most have attractive salary rates. As the demand for increased medical services broadens, the demand for physician assistants is expected to grow as well, since these workers relieve physicians of time-consuming tasks, allowing greater time for patient services.

| DOT Code: | | |
|---|---|---|
| | Physician Assistant | 079.364-018 |
| | Child Health Associate | 079.364-018 |
| | Orthopedic Physician Assistant | 079.364-018 |
| | Urologic Physician Assistant | 079.364-018 |
| | Surgeon's Assistant | 079.364-018 |

For further information, contact:
American Academy of Physicians' Assistants

# Podiatric Assistant

### Podiatric assistant, certified

The podiatric assistant (PA) work under the direction of a Doctor of Podiatric Medicine (DPM) and is responsible for carrying out instructions relating to prevention and routine treatment of human foot problems. The assistant performs various patient-related treatments intended to relieve minor but painful foot disorders so that the podiatrist is able to devote more time to examination, diagnosis, and complex treatment. Taking and developing X-rays and providing chairside assistance during examination and treatment for such ailments as skin and nail infections, corns, and cysts are some typical duties. Special assistance may be provided during surgery for bunion removal or the assistant may administer physical therapy by manipulating foot bones, tendons, and muscles. The PA may also do general office work, performing secretarial, bookkeeping, or receptionist duties.

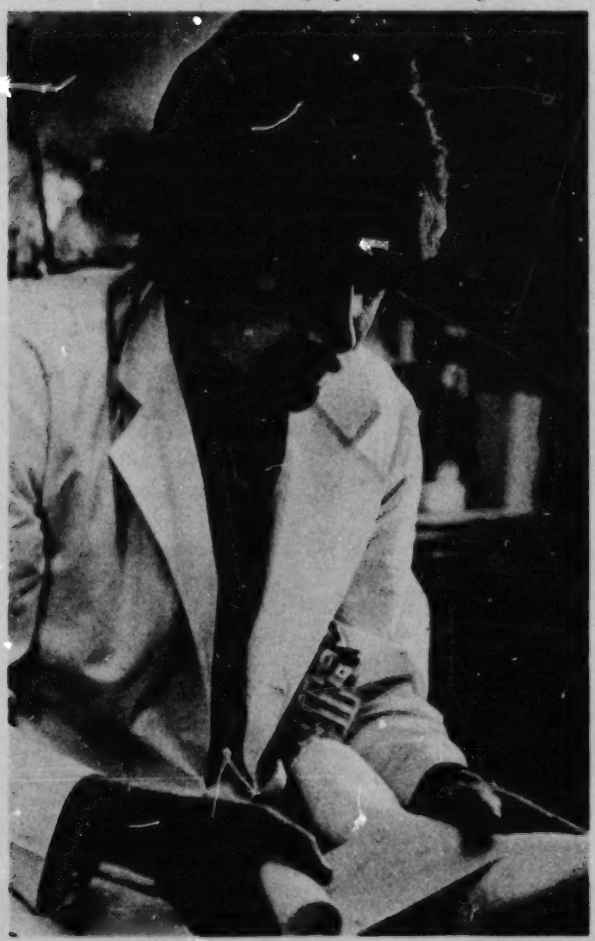
Podiatric assistants most often work in private or

group practices or for licensed podiatrists. Increasing numbers of PA's are required in large metropolitan hospitals to relieve staff podiatrists of routine duties. They are also employed in community clinics, government sponsored health programs, and in all branches of the armed forces.

The nature of the work of podiatric assistants requires that they be able to put patients at ease and get along well with both patients and coworkers. Generally, there are no specific physical requirements other than good health, but manual dexterity is an asset. However, assistants to podiatric surgeons must be able to stand for long periods of time during operations.

Assistants generally work the same hours as the podiatrist. Those employed by doctors in private practice may work up to 7 hours a day, 5 days a week. There may be occasional evening hours. Assistants employed in hospitals may be scheduled to work 1 or 2 nights a week.

Podiatric assistants usually specialize along the same lines as the doctor who employs them. Chairside assistants can be found working for podiatrists who care for the feet of the elderly—the field of podogeriatrics—or children's feet—podopediatrics. They may also work as surgical assistants for podiatric surgeons.



## Job Requirements

One-year courses in podiatric assisting are available to high school graduates at selected community or podiatric colleges. Classes include basic science, anatomy with special emphasis on the human foot, X-ray, physical therapy, instrumentation, sterile technique, making casts, laboratory procedures, and basic clerical practice. Clinical training is received in podiatric private practice, community college or podiatric college clinics. Requirements may vary among different schools.

Certification is available for students who successfully complete the examination given by the Qualifying and Examining Committee of the American Society of Podiatric Assistants. The title of Podiatric Assistant, Certified gives evidence of proven competence in the field. This certification is renewable annually with proof of continuing education.

## Opportunities

Employment prospects for this occupation are expected to be good for several reasons. As the average life expectancy in the United States rises, foot problems will also increase. At present, there are not enough trained podiatrists in the field, and, therefore, assistants will be needed to perform routine, time-consuming tasks and leave podiatrists free to devote more time to diagnosis and nonroutine work. Major urban areas are the sites of the greatest number of podiatric practices and will therefore provide the greatest areas of employment opportunity.

Advancement as a podiatric assistant is usually achieved through increased skill rather than promotion. The best opportunities exist for assistants who are willing to continue their education in a specialized area and possibly qualify as Podiatric Assistant, Certified. Podiatric assistants can also improve chances of long-term employment with a doctor in private practice by developing a range of skills needed in the podiatrist's office. Courses in office management and bookkeeping are useful additions to the assistant's knowledge.

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DOT Code: Podiatric Assistant 079.374-018

For further information contact:
American Podiatry Association

# Podiatrist

**Doctor of podiatric medicine**
**Foot specialist**

The podiatrist is a professionally trained foot-care specialist who diagnoses and treats diseases, injuries, and deformities of the feet and tries to prevent their occurrence. As with other medical practitioners, the podiatrist relies on physical examinations, tests, and X-rays to determine the nature of patients' foot problems, which may range from simple corns to infections, heel spurs, fractures, warts, and tumors. Treatment may include prescribing medication, surgery on foot bones, muscles, and tendons; physical therapy using ultrasound and diathermy; setting fractures; and preparing orthoses (supporting devices which mechanically rearrange the weight-bearing structures of the foot).

Podiatrists must also be alert to a patient's general health. Sometimes a disease like diabetes or hardening of the arteries will produce symptoms in the feet or legs. If the patient is not already under the care of a physician, the podiatrist will consult with and refer him or her to the appropriate medical specialist for treatment. In turn, people with diseases that affect the feet may be sent by their physicians to a podiatrist for foot care.

The nature of the work requires skillful hands and good vision. A knack for mechanical work is helpful, since quite a bit of electrical equipment is used and devices such as casts, braces, and splints must be made and adjusted. Equally important is the ability to relate well to the variety of patients and other medical staff with whom the podiatrist works.

Private practice is the choice of the majority of podiatrists, but other possibilities for employment include service as commissioned officers in the armed forces; full or part-time civil-service. Work in State and Federal hospitals; private hospitals, clinics, and public health departments.

Since podiatrists are usually self-employed, they regulate their own hours. Most work about 7 hours a day. Some have evening hours once or twice a week. Generally, there are no specific physical requirements. Although the work is not strenuous, certain specialty areas may make special physical demands. For example, a podiatric surgeon must stand for long periods while performing an operation.

Generally, podiatrists handle all kinds of foot-care problems. However, they may specialize in:

Podopediatrics—care of children's feet.

Podogeriatrics—care of feet of the elderly.

Podiatric Surgery—podiatric practice limited to surgical cases.

Orthopedics—correction or prevention of bone deformities of the feet.

Industrial and hospital podiatry—fields that may be of interest as well as the emerging field of sports medicine.

## Job Requirements

To become a podiatrist, a student must complete a 4-year course at a college of podiatry. Prior to admission, the student must have completed a minimum of 2 years of college education (the majority of applicants have baccalaureate degrees or higher). Courses taken must have included English, biology, organic and inorganic chemistry, physics, humanities, and social sciences. All applicants must have also taken the New Medical College Admission Test. The score attained on the test, the applicant's pre-podiatry grade-point average (marks should be high) and information obtained through personal interview are all considered in selection of candidates for podiatry school.

The 4-year professional course of study leading to the degree of Doctor of Podiatric Medicine (CPM) consists of two parts. The first two years are concentrated on classroom and laboratory work in basic medical and biological sciences, microbiology, and pathology. The last 2 years emphasize clinical sciences, techniques, and procedures coupled with practical experience in college or affiliated hospitals and clinics, and in offices of practicing podiatrists. Some colleges also have an arrangement which permits the student to complete requirements for a bachelor's degree as well as a degree in podiatry.

All States, Puerto Rico, and the District of Columbia have individual licensing agencies and laws regulating the practice of podiatric medicine. The National Board of Podiatry Examiners gives examinations that are accepted completely or in part to satisfy licensing requirements of over 40 States and branches of the armed forces. A few States require internship prior to licensing and a growing number of States have continuing education requirements in approved postgraduate training programs as a condition for license renewal.

Podiatrists may also enroll in the future in a higher degree program (DPM-PhD).

## Opportunities

Opportunities for podiatrists are excellent because podiatry is one of the least crowded of the health professions. Increased demand for podiatric services and population growth should result in a continued shortage of podiatrists for years to come. The best prospects for establishing a practice, however, often exist in small towns and suburban areas.

Since most podiatrists are self-employed, advancement usually consists of an expanding practice with income comparable to that of other health specialists. Podiatrists who are not self-employed can advance in ways defined by the type and needs of the employing facility. For example, a staff podiatrist in a hospital may advance to chief of podiatry; an assistant professor at a college of podiatric medicine may become a full professor; or a podiatrist serving in the military services may receive promotions in rank.

| DOT Code: | | |
|---|---|---|
| | Podiatrist | 079.101-022 |
| | Podogeriatrician | 079.101-022 |
| | Podiatrist, Orthopedic | 079.101-022 |
| | Podopediatrician | 079.101-022 |
| | Podiatric Surgeon | 079.101-022 |

For further information, contact:
The American Podiatry Association
The National Podiatry Association (Professional organization of minority podiatrists)

In the field of health, nursing plays a vital role in providing essential services to individuals and families in health-care facilities, schools, at play, and on-the-job. Caring for the sick is not the only function of contemporary nursing, however; nursing practice is equally concerned with the prevention of illness and the promotion of health in general.

The scientific aspects of modern nursing often provide the challenge desired by individuals, both male and female, who are making career choices. Today's nurse must understand patients' social and psychological needs; have a knowlege of complex drugs and their side effects; be familiar with modern techniques of treatment and rehabilitation; and be capable of using complex medical equipment. To meet these demands the individual must have a sound educational background in the humanities, the physical and social sciences, and the behavioral and biological sciences.

The nursing field offers a variety of careers, including such positions as registered nurse (RN), nurse anesthetist, nurse-midwife, nurse practitioner, and licensed practical or vocational nurse (LPN/LVN). Other jobs closely associated with this field are nurse's aide and homemaker-home health aide.

Registered nurses are an essential part of the health team and work primarily on hospital staffs, providing direct patient care. Some RN's engage in private duty, public health, industrial, or school nursing, while others work in physicians' offices and government agencies.

Nurse anesthetists are registered nurses (RN's) qualified by special training to administer anesthesia to patients. Working under the supervision of a physician, they are employed primarily by hospitals but also perform services in out-patient clinics, health-care facilities, dental clinics, and all branches of the military services.

Nurse-midwives are registered nurses (RN's) qualified by special training and experience in obstetrics to provide care for apparently normal expectant mothers and newborn infants.

Nurse practitioners are registered nurses (RN's) who have completed additional specialized medical training. They are middle-level health workers qualified to perform tasks usually performed by a physician, and work in physicians' offices, clinics, schools, homes, and hospital outpatient departments.

Licensed practical or vocational nurses (LPN/LVN's) provide basic nursing care to patients, under the direction of a licensed physician or registered nurse. They are important members of the health team and work in hospitals, nursing homes, extended-care facilities, physicians' offices, clinics, private homes, and schools.

Nurse's aides work under the supervision of nursing and medical staff while assisting in the care of patients in a health-care facility. Typical duties include serving meals, feeding patients, giving baths, responding to patient calls, and transporting patients to treatment units within the health facility.

Homemaker-home health aides are important members of a community agency's health and welfare team. Working in private homes, under the supervision of a nurse or social worker, they provide essential personal and homemaking services to ill, elderly, or disabled persons unable to care for themselves.

These positions are discussed in greater detail in the following section.

## Homemaker-Home Health Aide

Homemaker-home health aides are paraprofessionals. As members of a community agency's health and welfare team they provide personal and homemaking services to ill, elderly, or disabled persons and to children of families unable to perform basic tasks for themselves. Their assistance enables the people served to remain in their own homes. The responsibilities of homemaker-home health aides include assisting with bathing or giving bed baths, helping patients with walking and prescribed exercises, and helping individuals with braces or artificial limbs. Aides check pulse and respiration rates, change surgical dressings, and assist patients with medications. They also change bed linens, do laundry, and clean patients' living quarters. Aides plan and prepare meals and special diets for the family and patient and do food shopping. They observe the patient's progress or lack of it, report findings to their supervisors, and help the professional health team to determine if services should be changed. Their supervisors are usually registered nurses but in some cases they are physical, speech, or occupational therapists, or social workers.

In addition to their regular duties, aides provide patients with instruction and emotional support. They teach, through practical demonstration, such things as preparation of nutritious meals on a limited income, proper care of children, and household management. Aides teach clients how to adapt to various limitations in their lifestyles caused by disability, frailty, or illness. During periods of stress or depression they provide emotional support which is often critical to the patient's recovery and mental attitude. Aides are employed by

public-health and welfare departments, private health-care agencies, nonprofit community health and social service organizations, and some hospitals and nursing homes. Physical duties include lifting, moving, and supporting patients. Aides work alone in the patient's home and must be able to travel to and from work assignments. Aides work full or part-time, including weekends, and usually can obtain flexible work schedules from the employing agency.

## Job Requirements

There are no formal educational requirements for this work except that the individual must be able to read and write. The employing agency usually provides a pre-service training program lasting a minimum of from 40 to 120 hours or more, which covers such subject areas as basic nutrition; meal planning and preparation; and techniques for bathing, turning, and lifting patients. Other subject areas include emotional problems associated with illness, the aging process and behavior of the elderly, supervision, and participation in case conferences. Some employing agencies require training and experience as a nursing aide.

There are no licensure, certification, or continuing education requirements for this job. A certificate indicating completion of a required training course does not constitute a license or certification as a private practitioner. As a paraprofessional, this worker functions only under professional supervision.

## Opportunities

The number of jobs for homemaker-home health aides is expected to grow rapidly through the 1980's This estimate is based on growing public awareness of these services and increases in monies to pay for them, as States reconsider their expenditure of social-service funds. If new legislation permits public health plans, such as Medicare or national health insurance, to pay for long-term care, the increase in the number of jobs will be even greater. An aide with substantial experience in different types of cases may be promoted to an assistant supervisory position. The assistant supervisor assumes some of the supervisor's responsibility with regard to the more routine parts of supervision and case management.

DOT Code: Home Attendant 354.377-014

For further information, contact:

National Council for Homemaker-Home Health Aide Services, Inc.

# Licensed Practical Nurse

### Licensed vocational nurse

Licensed practical nurses (LPN's) or licensed vocational nurses (LVN's) work under the direction of a licensed physician or registered nurse or dentist. They provide bedside nursing care for the ill, injured, convalescent, and the handicapped in a medical facility or in the patient's home. In addition, LPN/LVN's assist the registered nurse with patients who are seriously ill. Typical duties include taking temperatures, blood pressure, and pulse and respiration rates and recording these data on the patient's chart. These nurses assist patients with personal hygiene and prepare them for medical examinations. They give injections, apply compresses, change surgical dressings, administer prescribed medications, and record the time and dosage on patients' charts.

LPN/LVN's observe and record pertinent information and report significant symptoms, reactions, and changes in the patient's condition to the appropriate person. These nurses assist physicians in performing therapeutic and diagnostic procedures and participate in the planning, implementation, and evaluation of nursing care. They assist with patient and family rehabilitation by providing emotional support, teaching self-care techniques, and suggesting the use of community resources. They often work in specialized activities, such as pediatrics; obstetrics; coronary care; intensive care; hemodialysis; or operating, recovery, or emergency rooms. When necessary, they gain additional training through continuing education, special courses, in-service training, or on-the-job training.

Licensed practical nurses work in hospitals, nursing homes, extended care facilities, day-care centers, physicians' or dentists' offices, clinics, homes, schools, camps, industrial establishments, public and home-health agencies, and correctional institutions. They work closely with patients, patients' families, and other health-care personnel, and must be physically able to spend prolonged periods of time walking and standing. LPN/LVN's are required to lift and turn patients regularly. Working conditions include exposure to infection, communicable diseases, unpleasant odors and sights, and various types of patient behavior.

## Job Requirements

Candidates for this career are required to complete a 12- to 18-month course in a State-approved training facility. Educational requirements for entry into these

schools vary from State to State, but the preferred level of education is completion of high school. However, some States permit candidates with 10th grade education to enter these training schools. Most schools require applicants to pass a written entrance examination as well as a complete physical examination. Training programs are offered in community colleges, public and private schools, hospitals, and health agencies.

Training programs consist of classroom instruction and clinical practice in basic nursing, medical-surgical nursing, obstetrics, pediatrics, and geriatrics. Classroom training includes anatomy, physiology, nutrition, community health, and human relations.

All States have laws for the licensing of practical nurses as LPN's (or LVN, licensed vocational nurse in California and Texas). Most States require graduation from an approved school to qualify for the State board exam for licensure. It is therefore important that the student choose a State-approved school. Graduates from correspondence schools are not eligible to take the licensing examination.

In addition, schools may be accredited by the National League for Nursing (NLN) or by the National Association for Practical Nurse Education and Service (NAPNES). The standards set by these organizations for accreditation are generally higher than those required for State approval.

LPN's as well as students enrolled in practical nursing courses may become members of the National Federation of Licensed Practical Nurses and of the National Association for Practical Nurse Education and Service (NAPNES). Both work toward the professional development of LPN's and also work in cooperation with allied health career groups in providing health-care services.

## Opportunities

The employment outlook for LPN/LVN's is good through the next decade. The LPN/LVN provides approximately 80 percent of the bedside nursing care in the United States. Population increases, greater emphasis on private and public insurance plans, plus expanded programs for the aged are expected to broaden opportunities for these workers, especially in geriatric and acute-care health facilities. An LPN/LVN may advance to registered nurse after completing studies in an accredited school of professional nursing and passing the State licensing examination. Most bachelor's degree nursing programs give the LPN little or no advanced credit for previous training and experience. Many associate degree programs, however, permit the LPN/LVN to take a special "challenge" examination. On successful completion of a challenge examination, the LPN/LVN receives advanced standing credit.

DOT Code: Nurse, Licensed Practical 079.374-014

For further information, contact:

National Association for Practical Nurse Education and Service
American Nurses' Association
National League for Nursing
The National Federation of Licensed Practical Nurses, Inc.

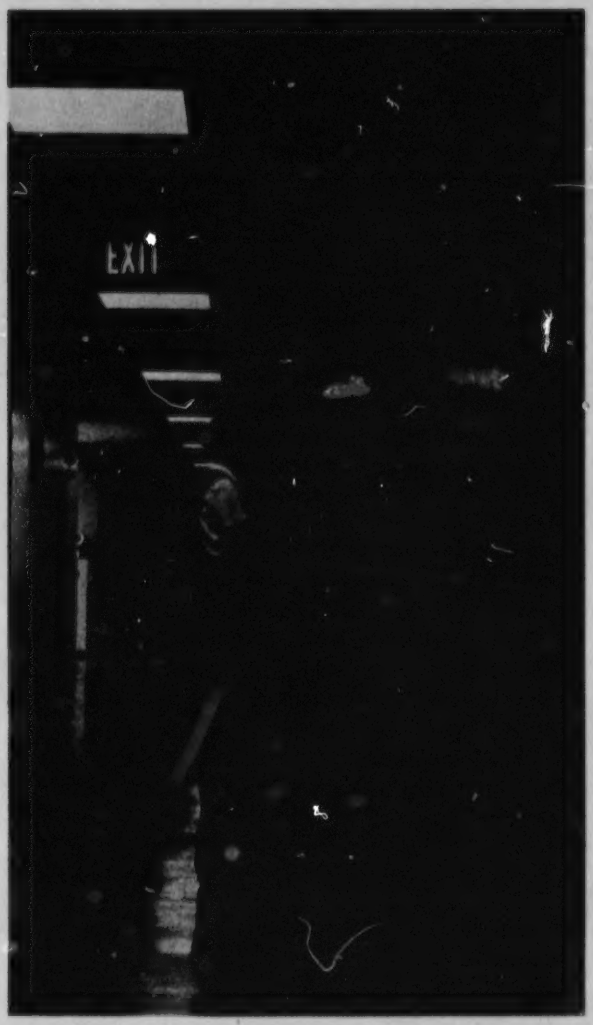
## Nurse's Aide

**Hospital attendant**
**Nursing assistant**
**Orderly**

Nurse's aides, working under the direction of nursing and medical staff, assist in the care of patients in a health facility. They answer patients' signal lights or bell calls to determine service needed and bathe, dress, and undress patients. They serve food, feed patients requiring help, and collect food trays after meals. They transport patients to treatment units in wheelchairs or assist them in walking.

Aides drape patients prior to examinations or treatments and remain with patients, performing such duties as holding instruments and adjusting and positioning lights. They dust and clean patients' rooms, change bed linens, deliver messages, and direct visitors. Nurse's aides also take and record temperature, pulse, and respiration rates and food and liquid intake and output, as directed. They also give massages and apply compresses.

Most nurse's aides work in hospitals, but they are also employed in nursing or convalescent homes and other long-term care facilities. The average workweek is 40 hours with shift and weekend work usually required. This work involves extended periods of walking and standing and also requires lifting and moving patients and equipment. Working conditions are usually good, but nurse's aides, like other members of the nursing team, are often exposed to communicable diseases and unpleasant odors and sights.




### Job Requirements

Candidates for this work must be at least 17 years old and have completed a minimum of 8 years of education, although some employers prefer persons with high school training. In addition, candidates must be tactful, neat, patient, emotionally stable, and have a genuine desire to help people. They should also be in good health and be able to pass a qualifying physical examination. Most employers conduct on-the-job training programs which last from several weeks to a few months.

### Opportunities

Employment prospects for nurse's aides are expected to be good during the next decade. This is based on the public demand for expanded health services, increases in population, and a greater awareness of the medical needs of our country's elderly.

Opportunities for advancement are limited for nurse's aides unless further training is secured. With specialized training they may prepare for such jobs as licensed practical nurse (LPN) or respiratory therapy technician. Training for these positions is sometimes available through the employing health facility.

DOT Code: Nurse Aide 355.674-014

For further information, contact:
American Hospital Association
Your local hospitals or nursing homes

## Nurse Anesthetist

### Certified registered nurse anesthetist

The nurse anesthetist is a registered nurse (RN) who is qualified, by virtue of special training, to administer anesthesia. Working under the direction of a physician, the nurse anesthetist administers intravenous, spinal, and other anesthetics which make the patient insensible to pain during surgical, obstetrical, and dental procedures. In conjunction with the physician, the nurse anesthetist evaluates the patient's condition and selects the proper anesthetic to be used. During the surgical procedure, the nurse anesthetist closely observes the patient's condition by checking vital signs and watches for significant changes in the patient's physical condition. The nurse anesthetist also provides patient care in the immediate post-operative period and submits a report to the physician when the anesthetic effects have subsided. In addition, nurse anesthetists frequently assist in the care of critically ill patients in intensive care, coronary units, and emergency rooms. Some nurse anesthetists work in the field of education or engage in research activities, while others do administrative work related to anesthesiology.

Nurse anesthetists work primarily in hospitals but also are employed in out-patient clinics, health-care facilities, dental clinics, and all branches of the military services. Nurse anesthetists work closely with physicians, patients, and other medical personnel, and the nature of this work requires that they be available to work irregular hours, including evenings, holidays, and weekends.

### Job Requirements

Preparation for this career includes completion of high school and graduation from an approved school of professional nursing. Candidates must hold a current license as a registered nurse (RN) and are often required to have 2 years of nursing experience in the care of acutely ill patients.

Training for nurse anesthetists is offered in certain accredited hospitals and universities and lasts approximately 24 months. The curriculum is divided between academic and clinical areas. Academic studies include courses in anatomy, physiology, biochemistry, and pharmacology. The clinical studies center on techniques and procedures used in the administration of anesthesia. On satisfactory completion of this course of study, the individual is granted a certificate by the school.

All states and the District of Columbia require a registered nurse (RN) license to practice as a nurse anesthetist. This license is issued by the State board of nursing after the individual passes a State-administered examination. Persons who wish to receive certification as a Certified Registered Nurse Anesthetist (CRNA) must do so through the American Association of Nurse Anesthetists. To qualify, the individual must be a registered nurse, be a graduate of an accredited school for nurse anesthetists, and successfully pass a national qualifying examination. Certification is not required by law; however, the CRNA credential is generally recognized as proof of professional qualification. The AANA has a continuing education program which operates on a 2-year basis for continued certification.

### Opportunities

Opportunities for nurse anesthetists are growing steadily as a result of increases in new hospital construction, expansion of existing health-care facilities, increases in population, and demands for greater medical services throughout the country. Opportunities for advancement in this field are numerous. For example, a nurse anesthetist who acquires sufficient experience, training, and advanced education may advance to chief of a department or section to a director's position in a school for nurse anesthetists or to a teaching position in an accredited university.

DOT Code: Nurse Anesthetist 075.371-010

For further information, contact:
American Association of Nurse Anesthetists

## Nurse-Midwife

### Certified nurse-midwife

A nurse-midwife is a registered nurse (RN) who has successfully completed a recognized program of study and clinical experience in obstetrics and is qualified to provide care for apparently normal expectant mothers. Nurse-midwives furnish professional care during the pregnancy, labor, delivery, and after-birth phases for both the mother and newborn infant.

During prenatal care, nurse-midwives perform total physical examinations of expectant mothers, including breast examinations, abdominal and pelvic examinations and evaluations, and Pap-smear tests. They provide warmth and support to the woman in labor, encouraging her to participate in the birth process according to her wishes and ability. As long as the

course of labor is normal, nurse-midwives manage the labor and perform the delivery. The obstetrician is consulted whenever there is any change from the normal. Treatments and medications such as sedatives and pain-relieving drugs are prescribed by nurse-midwives in accordance with the physician's and hospital's approved orders for nurse-midwifery service.

During delivery, nurse-midwives perform various technical procedures and assist mothers during the different stages of labor. After the birth, they provide immediate care for the newborn, perform simple resuscitation on the child if necessary, and are responsible for signing birth certificates. Nurse-midwives provide support and reassurance to mothers at times of infant feeding, emphasizing an early positive mother-newborn relationship. In addition, they provide examinations for mothers after they give birth and counsel and instruct those seeking birth control or family-planning information.

Nurse-midwives are never independent practitioners; they function as part of the obstetrical team. They manage and provide direct patient care, using delegated medical authority, in municipal and voluntary hospitals as well as with obstetrical groups for private patients. Many nurse-midwives have used their preparation in nurse-midwifery as background for employment in jobs as maternal and child-health consultants in Federal, State, and local health departments; as supervisors and administrators of maternity-care services; in parent education relating to childbirth; as professors and instructors of maternity nursing on all levels of nursing education; as teachers of nurse-midwifery; and in positions in the various branches of the armed forces.

The nature of nurse-midwifery practice requires these nurses to work closely with clients and their families, doctors, nurses and other health-care personnel. They frequently work long hours, sometimes on-call. Extra teaching and public-service activities, as well as the unpredictability of the obstetric specialty, often result in night, weekend, and holiday duties in addition to regularly scheduled clinic and patient rounds. Nurse-midwives must be in good physical condition to provide patient support during labor and birth, and must often lift, stoop, apply counter pressure, and do massages during the normal course of work.

## Job Requirements

Preparation for this career is available at the post RN level and master's degree level. The post RN programs are of approximately 8 months' duration and provide an intensive program of theory and clinical experience leading to a certificate in nurse-midwifery. The master's degree programs are 12 to 24 months long and offer the graduate student an opportunity to earn a certificate in nurse-midwifery in conjunction with a master's degree. Most schools consider it advisable for applicants to have clinical experience in obstetrical nursing prior to entering an educational program of nurse-midwifery.

Eighteen schools of nurse-midwifery are approved by the American College of Nurse-Midwives, which means that their graduates are eligible to take the national certification examination administered by the American College of Nurse-Midwives (ACNM), and upon passing the examination, the graduates are then entitled to use the official CNM (Certified Nurse-Midwife) after their names.

The license to practice nurse-midwifery is determined by the jurisdiction or State in which the nurse-midwife is employed. Laws providing separate licensure for nurse-midwives are currently in effect in the following States: Arizona, Florida, Kentucky, Montana, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Utah, Virginia, and West Virginia, plus Puerto Rico, Guam,

and the Virgin Islands. In order to determine exact legal standards, individuals are urged to contact the local or State authorities responsible for professional licensure.

## Opportunities

The employment prospects for qualified nurse-midwives, both male and female, are quite favorable. There is a shortage of trained personnel in obstetrics and gynecology, especially in rural areas, and the current consumer demand for quality health care should create increased demand. In addition, as obstetricians specialize to a greater degree and have less time for normal, uncomplicated pregnancy cases, maternity patients can be served efficiently by nurse-midwives acting as part of the medical team. Advancement in this field is based on experience, education, and skill level, and nurse-midwives with master's or doctoral degrees may advance to high-level administrative and academic positions.

DOT Code: Nurse-Midwife 075.264-014

For further information, contact:
American College of Nurse-Midwives
Maternity Center Association

# Nurse Practitioner

### Nurse clinician

Nurse practitioners are registered nurses (RN's) with additional, specialized medical training, who are qualified to perform certain medical duties normally performed by a physician. They provide medical services to patients to maintain good health, prevent illness, or deal effectively with acute or chronic health problems. The majority of nurse practitioners are associated with individual physicians, medical groups, or hospital clinics and out-patient departments. In rural areas, where physicians are available only on a limited basis, practitioners must exercise independent judgment consistent with sound medical practice.

Nurse practitioners interview clients, record their health histories, and judge physical condition by conducting routine physical examinations. They perform diagnostic tests, examine patients for symptoms of disorders, and take appropriate action to treat common ailments. They give injections and recommend routine medications. Nurse practitioners evaluate medical information and develop treatment plans and carry them out through health counseling, referrals to appropriate agencies, and collaboration with other health-care providers.

Nurse practitioners can enter private practice in some States. They offer skilled nursing care to the members of the community, make home visits, and have regular office hours. They perform such tasks as giving injections prescribed by the patient's physician, changing dressings, and counseling diabetics and persons with high blood pressure. In some States, nurse practitioners are permitted to take X-rays, set simple fractures, and suture minor cuts.

Nurse practitioners often work in specialty areas. Maternal-child nurse practitioners, for example, perform vaginal examinations, take Pap smears, and provide patients with counseling during pregnancy and after childbirth.

Pediatric nurse practitioners specialize in providing health care to children. They evaluate a child's health by judging growth, development, and physical condition, taking into account such factors as family makeup; physical environment; and social, economic, religious, and ethnic background. Using this information the practitioner determines the child's needs and problems and plans appropriate action such as medical consultation or referral to appropriate health care personnel.

The adult and family nurse practitioner specializes in providing health-care services to the total family unit, which can consist of adults with children, adults without children, and individual adults. The primary aim of this practitioner is to help the family attain good health through primary prevention techniques, health restoration activities, and practices aimed at maintaining good health.

The working conditions for nurse practitioners vary with the employment setting, but in general they are good. Most nurse practitioners work regular daytime hours. However, those employed in private homes are often called on to work irregular schedules, including weekends and evenings. Nurse practitioners work closely with their patients and must be able to develop good working relationships with other health professionals.

## Job Requirements

Nurse practitioner training varies widely; it is provided in hospitals, colleges, and universities. Some bachelor's degree programs in registered nursing prepare students to assume roles as nurse practitioners on graduation. Other programs admit registered nurses and range from several months of formal education and

clinical experience to a master's degree. In addition, some institutions require that the candidate be sponsored by a practicing physician, commonly known as a preceptor. The training program is composed of classroom work and clinical internship. Classroom work consists of programs of concentrated study in nursing theory and practice. The internship or preceptorship takes place in the clinical practice setting under the supervision of a licensed physician. The classroom and preceptorship portions of the training are usually coordinated so that the classroom instruction can take place under supervised clinical conditions, enabling the student to develop and demonstrate clinical competency.

Most training institutions grant a certificate on completion of the program. However, some schools offer students who qualify the opportunity to earn bachelor or master's degrees. The master's level program requires from 18 to 24 months of additional study beyond the bachelor's level. The school accrediting organization, in all cases, is the American Nurses' Association.

All nurse practitioners must be currently licensed as registered nurses (RN's), and since State laws govern services the practitioner can provide, it is suggested that the appropriate agency be contacted to determine current standards for practice.

## Opportunities

The need for nurse practitioners qualified to provide primary care services is expected to grow; currently, the demand for nurse practitioners exceeds the supply available. Since this is a relatively new occupation in the health field, information on promotion or advancement prospects is not available. However, as this area of specialization grows, practitioners with substantial experience and higher levels of advanced education will find broader opportunities for advancement.

DOT Code: Nurse Practitioner 075.264-010

For further information, contact:
American Nurses Association, Inc.

# Registered Nurse

Registered nurses (RN's) are an essential part of the health team and assist individuals with activities and patterns of behavior that promote recovery from illness. They help individuals to develop patterns of healthy living and to function independently. By means of a nursing diagnosis, nurses make a comprehensive assessment of the patient's total behavior, including psycho-social aspects, i.e., patient's interaction with family members. They also administer prescribed drugs, give injections, and provide treatments either when indicated or as directed by the physician. Nurses observe the patient's progress, record pertinent behavioral observations, and report reactions to drugs and treatments. They also assist the physician with treatments and examinations and prepare instruments and equipment for use. They are responsible for executing physician's orders and for supervising auxiliary nursing and other health personnel who perform routine care and treatment of patients.

Most nurses are employed as hospital staff nurses and provide direct patient care. Others are in private duty, public health, industrial or school nursing, or work in physicians' offices, community centers, nursing homes,

and rehabilitation centers. Areas of specialization require advanced education, as is demonstrated in the following examples: Gerontological nurses specialize in providing full nursing service to elderly patients in hospitals, nursing homes, clinics, and extended-care facilities. This specialty is relatively new, and greater emphasis is now being devoted to gerontological techniques in most nursing schools. Occupational health nurses, also known as industrial nurses, work in business, industry and government and provide for the overall health needs of employees. Duties include treating minor injuries and illnesses, assisting with physical examinations, and arranging for medical care. Intensive/critical-care nurses provide nursing services to acutely ill patients whose conditions require special attention. Nurses in this specialization are required to complete additional technical courses.

Medical-surgical nurses care for patients with acute and chronic medical problems and those recovering from surgery. Obstetrical nurses provide professional care to newborn infants and their mothers in the labor and delivery room, prenatal consultation, and care of mother and baby immediately after delivery. Operating room nurses are responsible for coordinating operating room nursing activities during surgical procedures. They also supervise other health workers in the operating room, such as scrub technicians and aides. Pediatric nurses specialize in providing care to children in hospitals, clinics, and schools. Psychiatric and mental health nurses, who have advanced training in mental health techniques, provide nursing care to patients with mental disorders. They usually work in private or government-operated psychiatric facilities and mental health clinics, although some have independent prac-

tices. Public health nurses assist nonhospitalized patients by providing nursing services and health counseling in private homes, clinics, community health centers, and schools. Restoring health, preventing illness, and carrying out good health practices are basic aims of this work. Duties include routine examinations, administering immunization shots, and recommending appropriate community resources to patients. The basic educational requirement for this work is graduation from a baccalaureate program in nursing. Rehabilitation nurses provide care and nursing services to patients in special hospital units or rehabilitation centers. The objective is assisting these patients to achieve their maximum level of health following serious illness or injury. School nurses plan and carry out, with the cooperation of school officials, the policies, standards, and objectives of the school health program. Most schools require such nurses to have at least a baccalaureate degree in nursing.

Registered nurses work closely with their patients and other health professionals and health workers, They must be able to communicate effectively with these individuals and be capable of dealing with changing or unexpected situations. The working hours of registered nurses are determined basically by the place of employment. The average workweek is 40 hours but nurses working in hospitals, nursing homes, or in private duty are usually required to work rotating shifts including weekends. Those working in schools, industry, and physicians' offices have more regular schedules. Nursing is demanding both mentally and physically and involves substantial amounts of standing and walking.

## Job Requirements

Applicants for nursing programs must be 17 or 18 years of age. The maximum age limit depends on the individual applicant and the school. Most schools of professional nursing have strict admission requirements and will accept only applicants with excellent academic records.

Professional nursing schools fall into three general categories: junior or community-college schools offering a 2-year associate degree program; hospital schools of nursing offering a 2- to 3-year diploma program; and colleges offering a 4-year baccalaureate program. All three types require graduation from high school, pre-entrance examinations, and a physical examination. Their programs cover the nursing arts and sciences, which form an essential background for nursing practice.

The associate degree program (2 years) includes general education courses, especially science at the junior or community-college level, in addition to nursing theory and practice, which includes supervised clinical experience working with patients in hospitals or other health facilities. The associate degree program is designed to stand alone and is not necessarily the first half of a 4-year bachelor's program. The diploma program is the only one conducted in a hospital. Training takes between 2 and 3 years and consists of general education courses, classroom instruction in nursing techniques and theory, and supervised clinical practice in hospitals or health facilities. The graduate of an associate degree or diploma program is known as a "technical nurse." Once licensed, a technical nurse is qualified to provide direct patient care requiring a high degree of technical nursing skill. Technical nurses are fully prepared to work with doctors and other health-team members to carry out treatment pians and meet the needs of patients.

Four-year baccalaureate programs leading to a bachelor's degree in nursing (BSN) are offered by colleges or universities. These programs consist of classroom studies in liberal arts, physical and social sciences, the humanities, and nursing. In addition, they include supervised clinical training working with patients in hospitals, clinics, community health centers, and nursing homes. A graduate of a 4-year program is a "professional nurse." In addition to providing traditional patient care, such nurses are prepared for assignments requiring independent judgment. These assignments may include health education, counseling, supervision, and administration.

It would be helpful to plan for a career in nursing as early as possible—even in the first or second years of high school. Since most nursing schools receive more applications than they can accept, it is advisable to apply by the end of the junior year. The National League for Nursing (NLN) maintains its own national accrediting program. Accredited programs must meet educational standards for faculty and curriculum above minimum standards set by State boards of nursing. Prospective students should try to select baccalaureate, diploma, or graduate programs accredited by NLN.

A license is required to practice professional nursing in all 50 States and the Districts of Columbis. In order to qualify for a license, the applicant must be a graduate of a State approved school of nursing and pass an examination administered by the State board of nurs-

ing. Students passing the State licensing examination are permitted to practice in the State and to identify themselves as registered nurses, using the initials RN after their names. Some nurses are licensed in more than one State, either by qualifying on an examination or through special agreements among States. Some States have begun to require evidence of continuing education as a condition for relicensing.

Registered nurses may become members of the American Nurses' Association. Along with friends of the nursing field, practical nurses, allied professional people, and others interested in health care, they may join the National League for Nursing, which provides them with an opportunity to work together with other people in their communities for the improvement of nursing education and nursing service. Professional nursing students have their own organization, the National Student Nurses Association.

## Opportunities

Generally, employment opportunities for registered nurses are expected to be favorable in the next several years, and, at present, in most parts of the country nurses can obtain employment without difficulty. Employment prospects, however, are expected to be best for nurses with bachelor or graduate degrees.

Professional nurses with graduate degrees can advance to positions as administrators, teachers, clinical nurse specialists, nurse scientists, or independent practitioners. Clinical nurse specialists, for example, complete a master's program in a selected area of nursing and develop advanced technical and nursing skills. Nurse scientists have doctorate degrees in nursing combined with basic science and engage in research to improve the health of mankind and to promote nursing as a profession.

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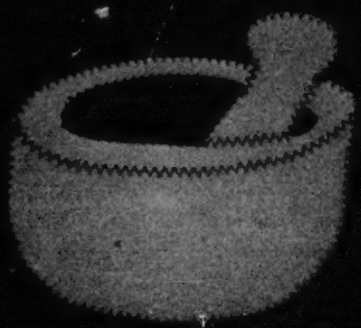
DOT Code: Nurse, General Duty 075.374-010

For further information, contact:
National League for Nursing
American Association of Occupational Health Nurses
Association of Operating Room Nurses
National Male Nurse Association
National Student Nurses Association

Pharmacy



To most of us, pharmacists are persons who prepare and dispense medicines prescribed by physicians, and, of course, this is their primary professional function. In recent years, however, the responsibilities of pharmacists have broadened substantially. Like the physician or nurse, the pharmacist is responsible for human life and must be dedicated to providing conscientious and dependable services. In addition, the pharmacist must have meticulous regard for accuracy, orderliness, and cleanliness. As highly trained experts in the science of drugs, pharmacists are vital members of the public health team and provide a variety of services to members of the community.

For example, the community pharmacy often serves as a health information center for a neighborhood. People frequently bring their health problems to the pharmacist, and it is often the pharmacist, guided by strict ethical standards, who convinces the individual to seek appropriate medical assistance. In other cases, the pharmacist helps customers to choose nonprescription health products for minor problems.

Contemporary pharmacists do less compounding of drugs than their predecessors, since many medical items are now available in prepared form, but they still must have a thorough knowledge of drugs and new developments in pharmacology. With many highly potent medications now being prescribed, the pharmacist's interpretation of prescriptions is critically important to the patient's safety. In addition, since pharmacists, whether in a community or hospital pharmacy, keep abreast of the latest developments in drugs, they are frequently called on to provide prescribing physicians with information on the uses and effects of various pharmaceuticals. As population increases and the level of health care rises, the role of the pharmacist, regardless of work setting, will assume greater importance.

Pharmacology is a medical science which focuses on the interaction of chemical substances, such as drugs, food additives, pollutants, and pesticides on living systems and their component parts. The central objective of this profession is the development of chemical agents which cure, mitigate, or prevent disease, or in cases which are incurable, make patients' lives as bearable and productive as possible. The scope of this work is quite broad, ranging from the careful appraisal of the effectiveness of drugs in the treatment of human disease to the effects of chemicals in the environment on the population.

Pharmacology is responsible for many substantial and significant contributions to mankind's well-being. Among these contributions are the development of drugs used in the treatment of heart disease, the evolution of chemotherapy, and discoveries about the functions of cells and organ systems.

Today, pharmacology plays a crucial role in the attempt to resolve many of society's major health concerns, including drug and alcohol abuse, the cost and effectiveness of new and old drugs, the potential hazards of pesticides and herbicides, the toxicity and safety of industrial chemicals, and the cure and prevention of major diseases through drug therapy. Pharmacology is a rapidly expanding science, and unresolved and constantly emerging problems can be expected to provide considerable challenge and opportunity to qualified persons entering this field.

## Pharmacist

Pharmacists are responsible for compounding and dispensing medications ordered by a physician, dentist, or other authorized prescriber. They must have a comprehensive knowledge of drugs, including their composition, chemical and physical properties, and uses. Pharmacists must also be familar with the effects of various drugs on healthy individuals, as well as on those who are ill, and they must have a thorough knowledge of procedures for testing drug purity and strength. The increasing complexity and variety of prescription drugs has caused prescribing physicians to rely on pharmacists as a source of accurate and unbiased information about these products.

The actual duties of pharmacists depend largely on the type of establishment in which they are employed. For example, the great majority of registered pharmacists work in different types of community pharmacies. The strictly prescription pharmacy or apothecary shop handles nothing but drugs and other items related to medical care. In the general community pharmacy, owned independently or by a large chain, most business may come from this source or from sales of merchandise traditionally found in drugstores such as cosmetics, stationery, and cameras. Chain stores, in particular, have expanded to include a wide array of merchandise. In large general merchandising pharmacies, the trend is toward hiring managers trained in business techniques and using pharmacists largely in their professional capacity, although it is not uncommon for pharmacists to combine management talent with their professional responsibilities.

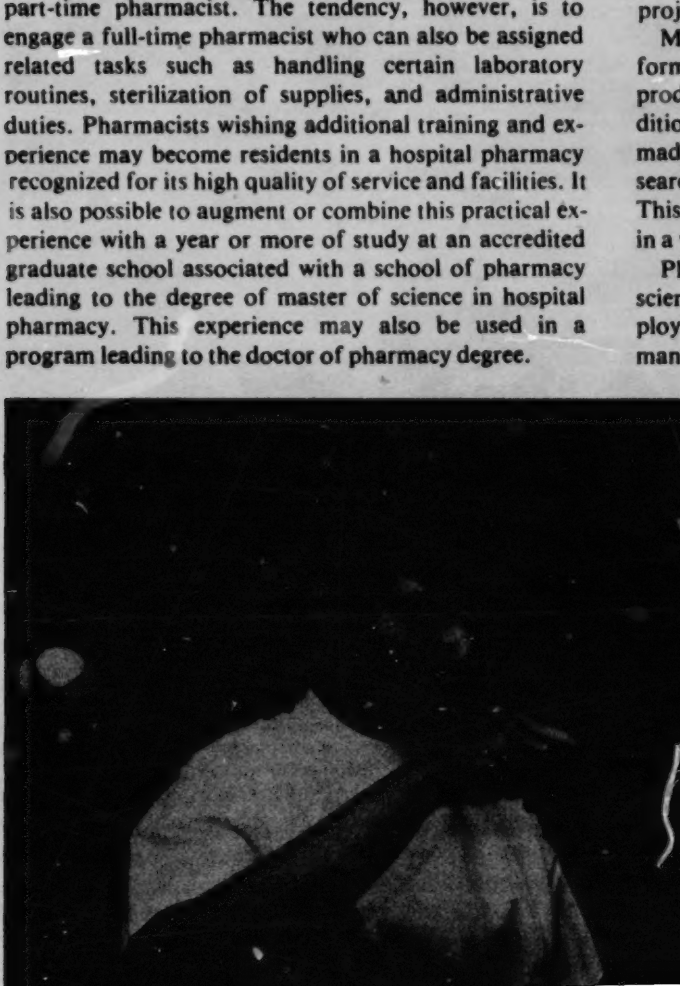
Pharmacists just out of school usually start out as assistants to the owner or manager of a pharmacy. After gaining experience, they often assume managerial duties or may wish to purchase a business.

One of the rapidly expanding opportunities open to pharmacists is pharmacy service in a hospital, nursing home, extended care center, or clinic. The routine duties of pharmacists in health facilities are similar in many respects to those of pharmacists dispensing prescription orders in community pharmacies but also include highly specialized tasks for which special training and experience are required. For example, radiopharmacists specialize in working with radioisotopes. Working as a member of a health team, radiopharmacists are responsible for in-house preparation, dosage-form compounding, and quality-control of radiopharmaceuticals. Training in this specialization may be obtained by completing elective courses within the standard pharmacy

curriculum or completing a 1-year master's degree program in radiopharmacy.

Health facility pharmacists work closely with the medical staff as well as with the administrator's office. As custodians of the facility's pharmaceutical supplies, they are responsible for purchasing a variety of pharmaceutical and related supplies. Pharmacists act as consultants on drug problems and as instructors in this field to other members of the facility staff. Frequently, pharmacists serve as monitors for the drug component of treatment. The need for pharmacists in hospitals, nursing homes, and clinics continues to grow, and this source of employment is becoming increasingly attractive to pharmacists.

Smaller health facilities frequently depend on nearby community pharmacies for their services or employ a part-time pharmacist. The tendency, however, is to engage a full-time pharmacist who can also be assigned related tasks such as handling certain laboratory routines, sterilization of supplies, and administrative duties. Pharmacists wishing additional training and experience may become residents in a hospital pharmacy recognized for its high quality of service and facilities. It is also possible to augment or combine this practical experience with a year or more of study at an accredited graduate school associated with a school of pharmacy leading to the degree of master of science in hospital pharmacy. This experience may also be used in a program leading to the doctor of pharmacy degree.

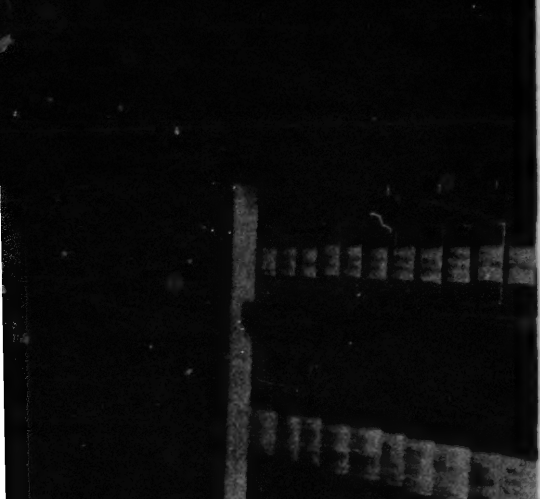


ıe broad preparation and experience of hospital macists and the intimate contact with hospital ad- stration may lead to more and more administrative . Pharmacists with a talent for administration can me fully qualified for administrative positions by pleting educational courses in an accredited school ospital or business administration.

harmacists are employed by the U.S. Public Health ice and all three branches of the armed forces. Ser- as commissioned officers, they can rise to the rank olonel in the Army and to equivalent ranks in the lic Health Service, the Navy, and the Air Force. rmacists are also employed by the Veterans' Ad- stration, where they have civil service status. Phar- ists also work in colleges and universities, where instruct or advise students or engage in research ects with other scientists.

any of the drugs and medicines which pharmacists erly compounded in their own pharmacies are now luced on a large scale by drug manufacturers. In ad- n, modern antibiotics, sulfa drugs, and vaccines are e only in special plants which rely heavily on re- ch, product development, and product control. means that the pharmacist's services are needed variety of establishments.

harmacists who are particularly interested in the ntific aspects of this profession can find em- ment in the laboratories of pharmaceutical ufacturers and may go directly from pharmacy



college to such employment. However, if their goal is research, they should go on to graduate study in pharmacy, pharmacology, pharmaceutical chemistry, or other pharmaceutical sciences. These are growing fields with excellent prospects for both men and women in all aspects of the pharmaceutical industry.

## Job Requirements

There are two professional degrees awarded in pharmacy, the bachelor of science (B.S. Pharmacy) and the doctor of pharmacy (Pharm. D.) The bachelor program involves 5 years of collegiate study.

Some colleges require 1 or 2 years of preprofessional education, followed by professional pharmacy studies, while others begin the professional education in the first year. In most cases, these preprofessional courses may be taken in an approved junior college or liberal arts college. Other schools offer an integrated study program where the student completes the 5- or 6-year program in the professional college. Students should request further information from the college of their choice. At present, there are 72 accredited pharmacy schools in the United States and Puerto Rico accredited by the American Council on Pharmaceutical Education, Chicago, Ill. Some schools offer the Pharm.D. as the only professional degree, while others offer a choice of programs, leading to either the Pharm.D. or B.S. degree. The Pharm.D. is also offered by some institutions as a graduate degree.

Professional courses studied in pharmacy can be grouped into the following seven general areas. Medicinal chemistry is the study of all aspects of chemicals used as medicinal agents. Pharmacognosy explores the nature and source of drugs obtained from plants or animals. Pharmacology is the study of the action of drugs in living biological systems. Pharmaceutics explores the physical and chemical properties of medicinal agents, with emphasis on the development of drug dosage forms and their impact on the pharmacologic activity of drugs. Other areas of study include pharmacy administration, pharmacy practice, and clinical pharmacy.

Students in high school should select courses which will prepare them for acceptance into pharmacy college. In addition to courses in mathematics, biology, chemistry, and physics, the student should also take nonscientific subjects such as English, history, and social studies. Care should be taken to check that the high school courses meet the entry requirements of the college.

In selecting students for admission, colleges of pharmacy consider the individual's class standing, personal qualifications, and the results of examinations such as the College Entrance Boards and/or the Pharmacy College Admissions Test.

Because pharmacists have such heavy responsibilities and are so closely concerned with the health of the people they serve, all States have strict laws about licensing and registration. These may vary from State to State, and the prospective pharmacist is instructed, while still in college, about the regulations applying in areas where he may wish to practice.

All of the States, with one exception, require graduation from an accredited school of pharmacy. Almost all of them, in addition, require practical experience, known also as internship. In most States, this requirement can be met by combining clinical assignments done in connection with classwork and experience gained during summer vacations. The student should check internship regulations carefully, since this may weigh heavily in obtaining a license to practice.

In order to receive a license, the graduate in pharmacy must pass an examination given by the board of pharmacy in the State where practice is planned. After passing the examination, the pharmacist is registered by the board. While most States honor licenses issued by other States, there are some exceptions and the pharmacist will be informed of these while still in school.

## Opportunities

The employment prospects for pharmacists are good. Factors such as longer life expectancy, higher health care standards, the rising health consciousness of the general public, and increases in the construction of new health care facilities account for this positive outlook. Pharmacists can advance in this field in many ways.

Pharmacists in community pharmacies may become managers after acquiring sufficient professional experience. Those with the necessary financial resources may become pharmacy owners.

Pharmacists in the employ of the government may advance through the traditional civil service process.

Pharmacists in research or manufacturing organizations may be promoted to high-level administrative or research positions.

Hospital pharmacists can elect to specialize in clinical pharmacy, administration, or education functions.

Pharmacists in teaching positions in colleges or universities may advance through the professorial ranks by continuing education leading to graduate degrees.

DOT Code: Pharmacist 074.161-010

For further information, contact:
American Association of Colleges of Pharmacy

## Pharmacologist

Pharmacologists apply knowledge and experimental techniques associated with the disciplines of mathematics, chemistry, and medicine to develop new drugs, judge the effects of chemicals on the environment, gain insight into the workings of cells and organs through the use of drugs, and study the properties of established drugs. Pharmacological research requires the use of the latest and most sophisticated scientific equipment and facilities. All pharmacologists are expected to develop a broad knowledge of all fields of specialization in order to be able to adopt new techniques when their research activities require them.

Most pharmacologists specialize in one of the research areas described in the following paragraphs. Clinical pharmacologists deal with the effects of drugs in human beings. While animal studies are useful in determining drug effects, the most accurate and conclusive information comes from the study of human beings. Through this form of patient-oriented research, pharmacologists gain detailed knowledge of a drug's activity by determining its effectiveness, poisonous characteristics, and interaction with other drugs. Clinical pharmacologists use their research findings to inform medical therapists of drug characteristics and of the safest and most effective methods of using drugs. They also act as consultants to physicians by providing detailed drug information and describing the influence of drugs on various forms of disease. Other major activities of clinical pharmacologists include the use of drugs as diagnostic tools, the development of valid methods of measuring drug effects, and the use of established drugs for new purposes.

Molecular pharmacologists study the biochemical and biophysical characteristics of interactions between cell and drug molecules. Their goal is the discovery of precise chemical, physical, and mathematical formulas for these interactions, which can be applied to existing drugs and used in the development of new drugs. Molecular pharmacologists play a vital role in such research areas as the chemical treatment of cancer, drug allergy, and antibiotic actions. They are responsible for many of the advances made in these areas.

Biochemical pharmacologists apply principles of biochemistry, cell physiology, and cell biology to determine how drugs interact with and influence the chemical machinery of an organism. Chemical reactions taking place in living cells occur in a precise fashion to insure the continued life of the cell. In organisms with many cells, these chemical processes also called biosynthetic processes, produce hormones and other compounds which reach distant cells and organs and influence their functions. The biosynthetic processes take place in sequence, and malfunctions arising in any component step affect those that follow. These malfunctions very often result in human disease. Biochemical pharmacologists use drugs to uncover new data about these biosynthetic processes and to determine how drugs can eliminate the biochemical malfunctions which cause human illness.

Neuropharmacologists specialize in the study of a variety of drugs which affect the functions of each part of the nervous system. This system includes the spinal cord, brain, and nerve fibers reaching all parts of the body. Some of these drugs affect single portions of the body, while others act on multiple locations. Some of the drugs relieve pain or anesthetize areas, and other suppress seizures or help in the treatment of psychiatric disorders. Neuropharmacologists investigate the causes of neurochemical disorders to develop new methods of drug treatment and study established drugs to determine the physical and chemical changes they cause.

Cardiovascular pharmacologists study the effects of drugs on the heart, blood vessel system, and those parts of the nerve and endocrine gland systems involved with heart and blood vessel functions. The primary goal of these specialists is to develop effective drugs for the treatment of such disorders as angina pectoris, hypertension, and congestive heart failure. One approach to learning more about cardiovascular disease includes intensive, experimental research on humans and animals, as well as on isolated tissues and individual cells. Other investigative efforts involve studies of metabolism, cardiac output, and the effect of drugs on arterial pressure. Since cardiovascular disease is a leading cause of death in this country, efforts to develop effective drugs can be expected to broaden.

Chemotherapists study drugs employed in treatment of viral, fungal, and bacterial infections, as well as for malignancies and spread of parasites in the body. Their goal is to develop drugs that destroy or inhibit the growth of invading organisms with minimum damage to the patient. These pharmacologists develop new drugs through extensive research efforts, and apply knowledge of the biochemistry of the patient, as well as of the invading organism, to help resolve medical problems. Many unsolved problems remain and work in this area of pharmacology can be expected to increase dramatically.

Behavioral pharmacologists study the effects of drugs on the behavior of species of animals such as rats, mice, and monkeys. Their goal is to discover the ways in which drugs alter the actions of the central nervous system. This research involves the objective and quantitative measurement of wide ranges of behavior. Research projects include investigation of the effects of chemical and electrical stimulation of the brain and of the way in which reward/punishment and pain/pleasure influence behavior and motivation. Through these and other forms of research behavioral pharmacologists have developed effective methods of controlling pain, anxiety, and some psychiatric disorders by using drugs coupled with other medical techniques.

Toxicologists study the adverse effects of chemicals, including drugs, on living systems. In addition to studying problems of drug safety and the effects of drug overdose, these pharmacologists also do research in industrial toxicology, which deals with the safety of chemicals found in the workplace; forensic toxicology, which is concerned with medical-legal aspects of poisoning and drug abuse; and environmental toxicology, which is concerned with problems of pollution.

Endocrine pharmacologists study the actions of drugs that are natural or synthetic hormones or drugs which affect the actions of normally secreted hormones. Since many diseases have metabolic origins and hormones regulate metabolic processes, the work of these pharmacologists is of vital importance in the struggle against disease.

Pharmacologists are employed by a number of different organizations. Those who work in pharmaceutical companies develop new or improved drugs used to treat and prevent human and animal diseases. Those who work in chemical companies are concerned with insuring the safety and usefulness of manufactured products such as food additives, detergents, pesticides, and solvents.

Pharmacologists are employed by Government agencies concerned with the protection of public health and safety, basic research activities, and the regulation of commerce. Among these agencies are the Energy Research and Development Administration, the National Institutes of Health, and the Food and Drug Administration.

Organizations that offer opportunities to perform research, such as medical centers, hospitals, and private foundations, also provide employment opportunities for pharmacologists. Pharmacologists interested in teaching careers often become faculty members of colleges or universities. They instruct veterinary, dental, nursing, and pharmacy students; medical and graduate school students; and undergraduates in colleges of arts and sciences. In some cases, pharmacologists combine teaching with research activities in the college or university.

## Job Requirements

A career in pharmacology requires extensive educational preparation, and there are different methods of entry into this profession. Students in medical college, for example, can specialize in pharmacology during their medical studies or may elect to do so after obtaining the M.D. degree. Another method is to complete a course of study in an accredited graduate school leading to a Ph.D. in pharmacology. Some individuals, with doctorate degrees in other basic medical sciences, such as biochemistry or microbiology, enter this profession by completing comprehensive, advanced courses in this specialization.

High school students preparing for this profession should select courses which prepare them for acceptance into undergraduate college. In addition to courses in mathematics, biology, chemistry, and physics, students should prepare by taking such nonscientific subjects as

English, history, foreign languages, and social studies. Care should be taken to insure that high school courses meet all the college entry requirements.

The college curriculum which provides a solid foundation for the graduate study of pharmacology includes organic and physical chemistry, differential and integral calculus, physics, and statistics. In addition, courses in English and communication arts to develop effective writing and speaking skills are of vital importance. Generally, a program leading to a Ph.D. involves about 5 years of study beyond the bachelor's level. A master's program takes approximately 2 years of full-time study, and the Ph.D. requires an additional 3 years of preparation after obtaining a master's degree.

## Opportunities

The demand for qualified pharmacologists, particularly clinical pharmacologists and toxicologists, is expected to remain high during the next decade.

Advancement possibilities in this field are quite good. Many pharmacologists go on to become directors of laboratories or drug research programs, professors in universities, and administrators in medical facilities and government agencies. Promotional prospects of course are greatest for those with master's or doctorate degrees.

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DOT Code: Pharmacologist 041.061-074

For further information, contact:
American Society for Pharmacology and Experimental Thorapoultion, Inc.

Psychology focuses on all aspects of human behavior, both normal and abnormal. It involves a scientific approach to gathering, quanitifying, analyzing, and interpreting data on why people act as they do, and provides insight into varied forms of human behavior and related mental and physical processes. Through the application of highly developed skills and knowledge psychologists seek to identify, prevent, and solve the varied problems of human behavior.

As a health career, psychology is one of the allied professions devoted to mental health. Along with psychiatry, psychiatric nursing, and psychiatric social work, psychology contributes both to the prevention of mental illness and to its diagnosis and treatment. As distinguished from psychiatry—which is a branch of medicine—psychology is a nonmedical science. As distinguished from psychiatric social work, psychology looks first at the individual's reaction to circumstances—family, job, and social relationships. The psychiatric social worker looks first at the individual's surrounding circumstances and relationships.

There are many areas of specialization in this profession, including clinical psychology, counseling psychology, developmental psychology, educational psychology, engineering psychology, personnel psychology, experimental psychology, industrial psychology, psychometric psychology, rehabilitation psychology, and school and social psychology.

A relatively recent development in the health field is the emergence of the career of psychiatric/mental health technician. Working as members of health teams, these technicians work in a wide range of mental health delivery programs providing care and treatment of emotionally or mentally disabled persons. They work as assistants to professional specialists on the health team, such as psychologists, nurses, and social workers, and carry out responsibilities under the direction and supervision of a professional team leader. Though they are not independent practitioners, psychiatric/mental health technicians play a key role in the health services field. This career will be discussed in greater detail in the following section.

## Psychiatric/Mental Health Technician

**Community mental health technician**
**Human service worker**
**Licensed psychiatric technician**
**Mental health assistant**
**Mental health associate**
**Mental health worker**

Psychiatric/mental health technicians, provide professional care and treatment to mentally ill and developmentally disabled individuals in a wide range of mental health programs. They work with, care for, and take direct charge of patients with various kinds of disabilities, including psychotic and emotionally disturbed adults, children, and adolescents; the acute and chronically ill; the mentally retarded; the aged; and alcoholics and drug abusers. Working under the supervision of a psychiatrist, psychologist, social worker, registered nurse, or senior psychiatric/mental health technician they participate in both the development of patient treatment plans and their implementation. Psychiatric/mental health technicians work in mental health hospitals and clinics; drug and alcohol clinics; schools for the mentally retarded; nursing homes; and community rehabilitation programs for the mentally ill and retarded such as halfway houses, sheltered workshops, and social rehabilitation centers.

These technicians differ from other health professionals because they function primarily as generalists in the field of mental health. Their main responsibility is to assist patients to achieve their maximum level of functioning. To this end, they work directly with individual clients and their families, as well as with other health professionals, to insure that treatment and rehabilitation plans are carried out effectively. Typical work activities include interviewing patients and families, gathering and recording data, providing behavior modification counseling, and conducting individual and group counseling sessions. In addition, technicians must be skilled in such nursing techniques such as taking temperatures, counting pulse and respiration, measuring blood pressure, and assisting in the administration of medications and physical treatments. Mental health technicians are also responsible for instructing patients in social skills and basic physical care; conducting behavior therapy programs; and assisting patients in resolving employment, housing, and personal finance problems.

Although the psychiatric/mental health technicians are usually generalists in the mental health field, there has been a movement toward specialization in some States. For example, in California technicians may work as specialists in the problems of mentally disturbed children or as clinical trainers for the developmentally disabled. Other specialties include work as counselors in substance abuse programs and work in psychiatric emergency or crisis intervention programs. When a patient's problems are beyond the expertise of the technician, the patient is referred to professional specialists. Psychiatric/mental health technicians must conform to professional and ethical standards; their contributions to the work of the health team are invaluable.

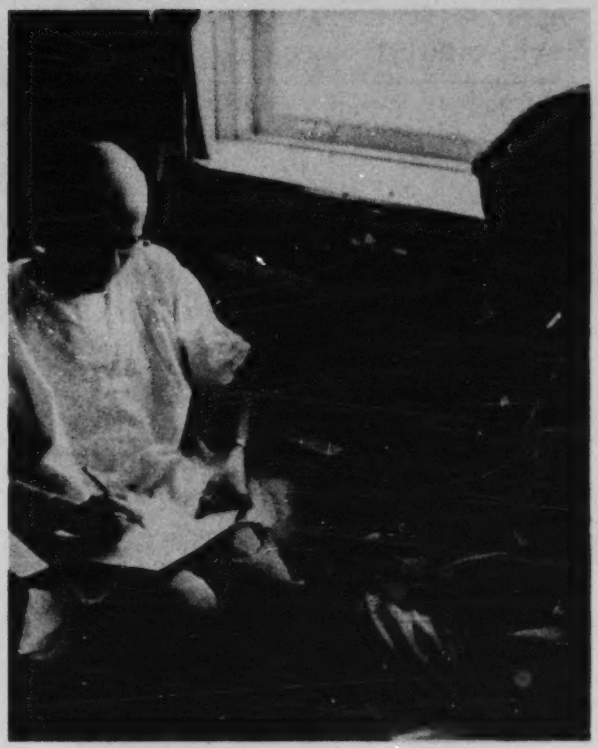
## Job Requirements

Educational requirements for this work include graduation from high school, plus completion of 1 or 2 years of specialized study in a hospital or community college program. Students attending community college are awarded an Associate of Arts or Associate of Science degree in Mental Health Technology on successful completion of the program, which usually consists of from 60 to 70 semester hours of training. Regardless of whether studies are undertaken in a hospital or community college, prospective technicians can expect the curriculum to include most of the following courses: basic and psychiatric nursing; general and abnormal psychology; child development and growth; mental health technology; group dynamics; sociology; personality and social development; general studies (English, history, mathematics); field and practical courses (working under supervision with clients in a mental health program). In addition to completing these educational courses, the prospective technician must have a stable personality and relate well to people in order to function smoothly with clients, their families, and professional staff members when providing services.

At present there is no national certification program involving psychiatric/mental health technicians. However, five States (California, Colorado, Kansas, Arkansas, and Michigan) have licensing requirements for these technicians, and specific information regarding qualifications may be obtained by contacting the licensing agencies of the respective States.

## Opportunities

Job opportunities for psychiatric/mental health technicians are expected to increase, due, in large part, to the present trend of returning previously hospitalized



persons to the various community health programs. In addition, expanded use of paraprofessionals in all areas of health care is anticipated because of the escalating costs of medical care. The use of these paraprofessionals is expected to reduce costs without jeopardizing the quality of care.

There are many programs throughout the country which utilize psychiatric/mental health technicians, but since this is a relatively new occupation, there are no clearly defined promotional lines in many cases. However, this is expected to change as mental health programs expand throughout the nation. In addition, the emergence of new or expanded undergraduate and graduate programs in mental health in many States can serve as a means for advancement. In general, advancement is achieved by gaining experience, developing competence and leadership ability, and by continuing education. In some cases, promotions are governed by civil service regulations and advancement is based on experience and the successful passage of promotional examinations.

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DOT Code: Psychiatric Aid 355.377-014

For further information, contact:
National Association of Human Services Technologists

## Psychologist

Psychologists study the behavior of individuals or groups to ascertain and understand the fundamental processes of human behavior. Some psychologists interview people and develop, administer, and score a variety of psychological tests. Others provide counseling and therapy to persons suffering emotional or adjustment problems in mental health and rehabilitation centers, hospitals, and private practice. Since psychology is, basically, a science, the psychologist is often the most knowledgeable member of the mental health team concerning research. The science of psychology is one of the main sources of our increasing understanding of mental capacity and intelligence and of the effect of emotions on health. Psychological research is continuously contributing to the improvement of diagnostic methods and to the treatment and prevention of mental and emotional disorders.

Psychologists also work with disabled persons, either individually or in groups, to diagnose behavioral problems and to help correct or compensate for these impairments.

Designing, developing, and evaluating materials and procedures to resolve problems in educational and training programs may also be a part of a psychologist's work. In addition, psychologists employ scientific techniques to deal with the problems of motivation and morale in the work setting. Psychologists design, conduct, and analyze the results of experiments to improve understanding of human and animal behavior.

Some psychologists engage in private practice; others work in colleges and universities, where they train graduate and undergraduate students and engage in basic research. Increasingly, they work as administrators of psychology programs in hospitals, clinics, and community health agencies. Many psychologists practice in Federal, State and local agencies, a variety of business and industrial organizations, and various branches of the armed forces.

The field of psychology offers a number of areas of specialization which an individual can consider when planning a career. Clinical psychologists specialize in the assessment and treatment of persons with mental and emotional problems and illnesses. They apply experience and scientific knowledge of human behavior to diagnose and treat psychological problems ranging from the developmental crises of adolescence to extreme psychotic conditions. Working in hospitals, clinics, or similar medical institutions, clinical psychologists design and conduct research either alone or in conjunction with physicians or other social scientists. Though the emphasis may differ considerably from one position to another, all clinical psychologists have in common the application of scientific knowledge of human behavior to the care and treatment of the handicapped and the disturbed. Their purpose is to help the individual who is maladjusted or a misfit to learn new and better habits of behavior in order to find a more satisfactory way of living.

Clinical psychologists work directly with the patient/client to uncover everything that will help in understanding his or her difficulties. They also talk with the patient's family, friends, physicians, and teachers to round out this background and at times consult with the psychiatrist, social worker, and others concerned with diagnosis and treatment.

Counseling psychologists help normal or moderately maladjusted persons, either individually or in groups, to gain self-understanding, recognize their problems, and develop methods of coping with their difficulties. Counseling psychologists pay particular attention to the role of education and work in a person's behavior and to the interaction between individuals and the environments in which they live. The emphasis in this type of counseling is primarily on preventing or forestalling the onset of mental illness. Growing public awareness of mental health problems has highlighted the importance of and need for the services which these psychologists provide.

Developmental psychologists specialize in investigating the development of individuals from prenatal origins through old age. In studying changes of their mental, physical, emotional, and social growth, psychologists seek to determine the origins of human behavior and the reasons for human growth and decline. For example, psychologists study how an infant's behavior and feelings are related to biological growth of the body. Another example is the study of the influence of social learning and socialization on an infant's development into a socialized person.

Educational psychologists design, develop, and evaluate materials and procedures to resolve problems in educational and training programs. These psychologists analyze educational problems, develop instructional materials, determine the best conditions for instruction, and evaluate the effectiveness of the programs.

Educational psychologists are employed by school systems, the military services, private research and development firms, and industrial concerns.

Engineering psychologists deal with the design and use of the systems and environments in which people live and work. Their main purpose is the development of efficient and acceptable interaction between individuals and the environment in which they function. These psychologists help to design equipment, work areas, and systems involving direct interaction of humans with machines. In addition, they develop the aids, training devices, and requirements necessary to train personnel to operate such systems successfully.

The personnel psychologist applies professional skills in the hiring, assignment, and promotion of employees to increase productivity and job satisfaction. These psychologists place great emphasis on data gathered from tests and interviews and apply the techniques of other areas of psychology such as the experimental, developmental, and psychometric specializations to normal work activities.

The experimental psychologist designs, conducts, and analyzes experiments to develop knowledge regarding human and animal behavior. Experimental psychology is a general term referring to the methods employed in studying behavioral processes. There are different types of experimental psychologists and they are identified by their areas of specialization, such as comparative psychologists, learning psychologists, and physiological psychologists.

Industrial psychologists employ scientific techniques to deal with problems of motivation and morale in the work setting. These psychologists study how work is organized and suggest improvements designed to increase work quality, productivity, and worker satisfaction. They consult with all levels of management and present recommendations for developing better training programs and preretirement counseling services.

Psychometric psychologists are directly involved with the measurement of human behavior, primarily through the use of tests. Typically well trained in mathematics, statistics, and the use of computers, they design, develop, and validate intelligence, aptitude, and personality tests; analyze complex statistical data; and design various types of research investigations. In addition, they conduct pilot studies of newly developed materials and devise and apply procedures for measuring the psychological variables affecting human behavior.

Rehabilitation psychologists work with disabled persons, either individually or in groups, to assess the degree of disability and develop ways to correct, remedy, or compensate for these impairments. The primary concern of these psychologists is the restoration of the patients' emotional, physical, social, and economic effectiveness.

School psychologists are concerned with developing effective programs for improving the intellectual, social, and emotional development of children in an educational system or school. They diagnose the needs of gifted, handicapped, and disturbed children and plan and carry out corrective programs to enable them to do school work at their highest potential and to adjust to everyday pressures. To determine a child's needs, limitations, and potentials, school psychologists often observe the child in the classroom and at play, study school records, consult with teachers and parents, and administer and interpret various tests. They advise school administrators and parent-teacher groups in matters involving psychological services within the school system and serve as consultants in education for children who are handicapped, mentally disturbed, or mentally retarded. School psychologists also engage in planning and developing special programs in the area of adult education.

Social psychologists study the effects of groups and individuals on the thoughts, feelings, attitudes, and behavior of the individual. They study, for example, the ways in which our social attitudes develop and how members of families, neighborhoods, and communities influence each other.

## Job Requirements

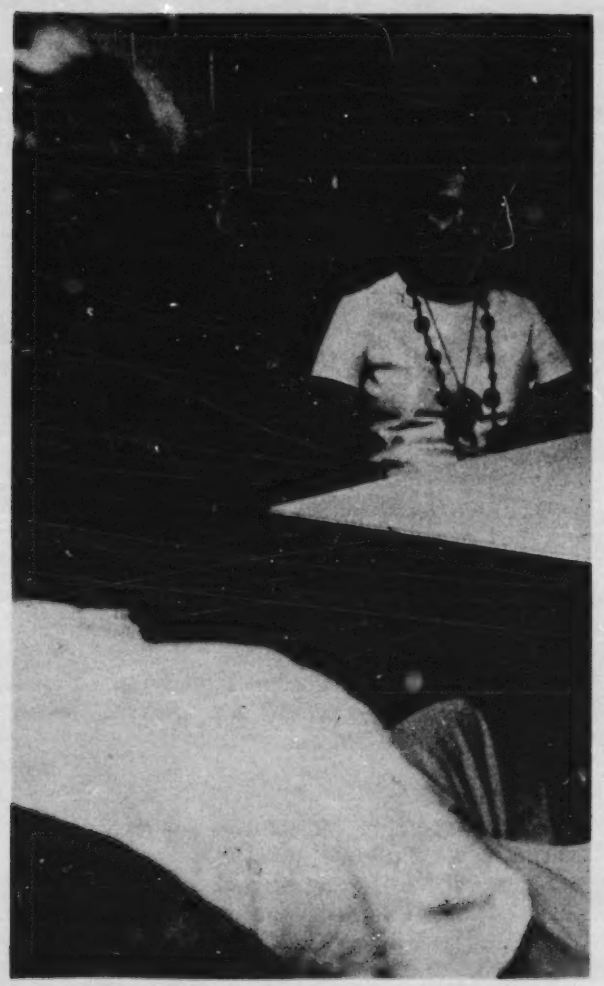
Students considering this profession can expect to spend many years in training and preparation beyond the high school level. Most opportunities exist for individuals with a doctoral degree in psychology, and individuals with lesser degrees, in many cases, may not be identified as psychologists. Some specializations, such as clinical psychology, require completion of an internship in conjunction with a doctoral program of study.

High school students can prepare for this career by enrolling in an academic program of study, including such subjects as English, mathematics, social, biological, and physical sciences. Care should be taken to select high school courses which meet college entry requirements.

College preparation for graduate studies should include a major in psychology. Doctoral studies involve an additional 3 to 5 years of graduate study. Beyond this, the top in formal recognition is that of the diplomate in psychology. This is similar to the

recognition accorded by the various medical specialty boards. Becoming a diplomate takes at least 5 years of experience beyond the Ph.D. or the Psy.D. (Doctor of Psychology), plus an examination before the American Board of Examiners in Professional Psychology.

All 50 States and the District of Columbia have licensing or certification requirements for psychologists. California, Colorado, Maryland, Minnesota, New Mexico, N. Dakota, Oregon, S. Dakota, and Iowa have continuing education requirements for licensing or certification renewal. Psychologists in private practice must be licensed or certified and in nearly all States must possess a doctoral degree. The State board of examiners conducts examinations and issues licenses or certificates to practice. In addition to legal standards, psychologists work under a code of professional and scientific ethics established to protect the public and to insure the highest quality of practice.



## Opportunities

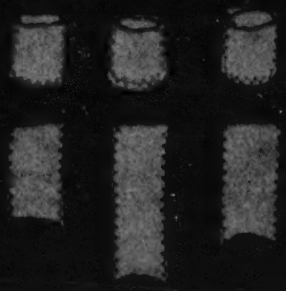
Employment prospects for psychologists as a whole are expected to be favorable for the next several years. Opportunities for those specializing in such areas as clinical, social, school, industrial/organizational and counseling psychology are expected to grow rapidly.

Geographically, the distribution is countrywide, but generally psychologists work in large cities rather than in small towns. Many psychologists engage in private practice, but the majority hold salaried positions in public and private institutions and agencies or in large industrial organizations. Psychologists may advance to higher level administrative positions in colleges, universities, private and government agencies and institutions, and industrial organizations. In general, promotions are based upon levels of experience and competence as well as on completion of advanced educational courses.

| DOT Code: | | |
|---|---|---|
| | Clinical Psychologist | 045.107-022 |
| | Counseling Psychologist | 045.107-026 |
| | Developmental Psychologist | 045.061-010 |
| | Educational Psychologist | 045.067-010 |
| | Engineering Psychologist | 045.061-014 |
| | Personnel Psychologist | 045.107-030 |
| | Experimental Psychologist | 045.061-018 |
| | Industrial Psychologist | 045.107-030 |
| | School Psychologist | 045.107-034 |
| | Social Psychologist | 045.067-014 |
| | Psychometrist | 045.067-018 |

For further information, contact:
American Psychological Association
American Psychiatric Association

Science and Engineering



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Medicine as it is practiced today could not exist without the vast and expanding body of scientific knowledge contributed by research scientists, clinical scientists, and their technical support personnel. The work of these individuals is basic to modern medical practice; their research into the unknown has resulted in the development of new and improved drugs, equipment, and information which have contributed enormously to the effectiveness of modern methods of diagnosis and treatment.

Two basic types of scientific occupations are associated with the health field: occupations concerned with pure scientific research and occupations that use scientific knowledge to detect and identify disease, disorder, or other changes in the body and its functions or in social-environmental conditions that affect the health of the individual and society in general.

Many vocational-development programs begin in the applied research lab and end in the pure research setting. Indeed, there is much cross-over between the medical and scientific professions in general; physicians and other medical professionals frequently serve on scientific research and development teams and may even switch from patient-treatment to medical research activities, while medical research scientists are often called on to provide diagnostic and consultation services to medical personnel on a regular basis. Research scientists working in the health field do not work only in a laboratory; they are active participants in the struggle to detect and eliminate the causes and symptoms of disease and sickness.

Today more than ever engineering skills are being applied in human biology, medicine, and the health field in general, resulting in significant advances in scientific and medical research and in methods of treating injuries and disease. The successful application of engineering and related technologies has brought about the development of new instruments for use in medical and surgical care; the invention or perfection of devices to repair or aid parts of the body that do not function properly; and the advanced application of computer technology to health services and research.

Science and engineering are also being successfully applied in the area of environmental health. For example, sanitarians, also known as environmentalists, apply knowledge of physical, biological, and social sciences to improve, control, and manage our environment. Environmental engineers apply scientific and technical principles to such areas as the management and proper use of air, water, and land resources. Industrial hygienists are important members of the industrial health team along with safety engineers, physicians, and other health-services environmentalists. They specialize in detecting, evaluating, and controlling or preventing disease-producing agents in the work environment. These are only a few of the careers in medical engineering and environmental health. These careers and others are fully described later in this section.

There are many scientific careers available for persons interested in medical research. The following paragraphs briefly describe a number of these.

## Biomedical Engineer

Biomedical engineers apply theory from the physical sciences (chemistry, physics, geology) and technology from science and industry to the solution of problems in medicine and the life sciences. They occupy an important place, like the physician and surgeon, in every aspect of health care and preventive medicine. Their contributions have revolutionized scientific and medical research and are responsible for many of the recent dramatic advances in prevention and treatment and in the repair of damage done by accident or disease. Biomedical engineers design and build medical instruments and devices such as artificial kidneys, joints, arms and legs, heart valves, and cardiac pacemakers, ventilators, and lasers for surgery. They also study such materials as silicone, plastic, and stainless steel to determine whether the body will tolerate them. Biomedical engineeers adapt computers to medical science and diagnostic methods. They use computers to monitor patients in an operating or intensive care room, or even to monitor astronauts in space, or divers under the sea, by processing electrical activity of the heart, heart rate, blood pressure, and body temperature. Other biomedical engineers design and build systems to modernize laboratory, hospital, and clinical procedures. They may also design and develop improved methods for observing and relieving physical ailments.

Today, the title "biomedical engineering" serves as a general term describing the work of engineers in the biological and medical sciences. Bioengineering, clinical or hospital, or medical engineering, and bio-environmental engineering are generally considered specialty areas within the field of biomedical engineering. Clinical engineers apply engineering concepts and technology to improve health-care delivery systems in hospitals, clinics, government units, universities, and industry. Medical engineering is concerned with using engineering concepts and technology to

develop instrumentation, materials, diagnostic and therapeutic devices, artificial organs, and other equipment needed in biology and medicine. Bioenvironmental engineering uses engineering concepts and technology to maintain and improve the quality of our environment and to protect human, animal, marine, and plant life from toxicants and pollution.

Frequently, biomedical engineers direct, train, and supervise technicians and medical personnel in the proper use of equipment, and practically all positions involve some administrative and supervisory responsibilities. Biomedical engineers work in hospitals; research foundations; medical, academic, industrial, and government laboratories; and in undersea and space programs. Some biomedical engineers also work as private consultants.

## Job Requirements

In past years, biomedical engineers came from established engineering disciplines (electrical, mechanical, chemical, civil, aerospace, or industrial) and added courses from the biological and medical sciences. Today, 24 colleges offer undergraduate degrees, 49 colleges and universities offer one or more degrees in biomedical engineering, and more programs are being planned. Students can prepare for a career in biomedical engineering by taking the following high school courses: 4 years of English, 3 or 4 years of mathematics (algebra, geometry, trigonometry, advanced mathematics), and 1 year of physics. In addition, college entrance examinations plus a good scholastic average are usually required for admission to college.

At the college or university level, some schools offer a minor in biomedical engineering for students majoring in one of the traditional engineering disciplines, while other schools offer degrees in biomedical engineering. To become a successful biomedical engineer, it is first necessary to become an excellent engineer. This means that once in college, a person should not substitute non-engineering courses for an engineering course, even if it is for biology or chemistry or anatomy. Such courses should be taken as electives. The reason for this is that biomedical engineers must contribute wide engineering knowledge to the team effort composed of medical, life, social, and physical scientists and specialists. Biomedical engineers must have the necessary background to design, repair, or modify electrical circuits or mechanical devices, or to analyze a biological problem mathematically. Biomedical engineers need to draw from many engineering disciplines to be useful team members.

Biomedical engineers must understand medical terminology and be able to communicate effectively in oral and written form. Difficulty in communication among physicians, medical personnel, and engineers is a major problem. Biomedical engineers can minimize communication problems by taking courses from life science and medical faculty and an "internship" or short-term work study experience in a hospital, clinical, or medical setting. A formal course in technical writing and oral communication would be most valuable. In selecting a college or university, a particular school's approach to biomedical engineering (a few courses, and option program, or a department) is not nearly as important as the quality of training that can be received in engineering and in the biological, behavioral, physical, and mathematical sciences. The majority of 24 undergraduate programs surveyed agreed that a bachelor's degree in biomedical engineering should not be viewed as a final degree. At least 50 percent of the graduates of the nine largest undergraduate biomedical engineering programs entered graduate or medical school. Graduate education in biomedical engineering is better established than undergraduate education. Many of the early academic programs in this field began with graduate education and later expanded to offer courses and

programs at the undergraduate level. Forty-three colleges offer graduate degrees in biomedical engineering.

In the field of engineering, State boards test, evaluate, and license individuals as professional engineers in specific disciplines. A few States have begun to license biomedical engineers, and other States are expected to follow soon. It appears that biomedical engineers involved with matters relating to the safety of patients or the health care field may become subject to mandatory testing, licensing, and certification. A few States and some hospitals require that biomedical (or clinical) engineers be licensed and/or certified to practice, and more are expected to do so. At present there are two professional testing and certification groups for clinical engineers. One is affiliated with the Association for the Advancement of Medical Instrumentation, and the other with the American Board of Clinical Engineering.

### Opportunities

Biomedical engineering is a relatively new field, and since technology is becoming increasingly complex, prospects for careers in this field are favorable. Most reports indicate that the need for biomedical engineers will far exceed the supply into the 1980's. More than $1 billion is spent in biomedical instrumentation each year, and more than $150 million is spent by the Government on medically related research and development projects. Individuals with a master's or Ph.D degree have the best prospects for employment, and graduates with these credentials have little difficulty in finding employment in teaching, medical research, government, and the health-care delivery system. Newly established undergraduate programs in biomedical engineering have not graduated sufficient numbers of students for evaluation of employment prospects at that level of training. However, new Federal Drug Administration regulation of medical devices and the eventual development of national health insurance and mass health screening and maintenance centers should provide many new career opportunities at the bachelor degree level.

Qualified biomedical engineers can advance through various levels of responsibility and become supervisors or assume administrative duties. Some engineers also become self-employed or provide services as consultants. As a rule, advancement is based on experience, skill level, and completion of advanced training.

DOT Code: Biomedical Engineer 019.061-010

For further information, contact:
Biomedical Engineering Society
The Association for the Advancement of Medical Instrumentation
Alliance for Engineering in Medicine and Biology

## Biomedical Equipment Technician

Biomedical equipment technicians construct, adapt, maintain, and repair various types of medical electronic equipment used to diagnose and treat disease. They assist practitioners, nurses, and researchers in conducting experiments and procedures, and instruct medical staff on the proper use of various types of equipment. Technicians may also be involved in supervision of equipment-control, safety, and maintenance programs. It is essential that biomedical equipment technicians be knowledgeable about the theory of operation, underlying physiological principles, and the practical, safe, clinical application of biomedical equipment. Technicians from different fields are doing good jobs in biomedical engineering shops and laboratories and are finding new uses for their special skills. Watchmakers, for example, can adapt readily to the making of miniaturized devices. Training in plastics can lead to work on the development of artificial organs. Glassblowers make precision parts for specialized equipment. Electronics technicians are involved in almost every phase of biomedical engineering. Biomedical equipment technicians often work alongside biomedical engineers and medical personnel in medical facilities, universities, industry, and government; and hospitals and clinics are becoming increasingly interested in utilizing their skills.

### Job Requirements

To become a biomedical equipment technician, an individual must be a high school graduate and complete a 1- to 3-year training program in biomedical equipment technology. Some schools refer to these programs as "medical electronics technology" or "biomedical engineering technology." There are approximately 32 training programs currently being offered in the United States. Almost all of these programs offer associate arts degrees and some include field work experience as part

of the training. It is important that the technician have knowledge in such areas as anatomy and physiology, electric and electronic fundamentals, medical-equipment function and operation, safety in health-care facilities, and medical-equipment troubleshooting.

A certification program is maintained for biomedical equipment technicians by the Association for the Advancement of Medical Instrumentation. This program provides an opportunity for technicians to be formally recognized as individuals who have demonstrated certain knowledge of the overall field of biomedical-equipment technology. A written examination is required for certification. In some cases, individuals with less than an associate degree may substitute experience for education requirements.

### Opportunities

Biomedical engineering is a growing field which should provide increased opportunities for biomedical equipment technicians, especially in clinics and hospitals. Through additional education and/or experience, a biomedical equipment technician can become more skilled and qualify for higher-level work. In some positions, it is not necessary to have an associate degree, but the individual is able to advance through on-the-job training, plus substantial work experience.

DOT Code: Biomedical Equipment Technician 019.261-010

For further information contact:
Association for the Advancement of Medical Instrumentation
Technical Education Research Center

## Environmental Engineer

Environmental engineers apply scientific principles and technical practices to the protection and improvement of human health, well being, and surroundings. They are concerned with the management and best use of air, water, and land resources and with providing facilities and controlled conditions for living, working, and recreation. There are several areas of specialization in environmental engineering; the following paragraphs describe some of them.

Air pollution control engineers are concerned with detecting and removing pollutants in the atmosphere that may be dangerous to the health and welfare of all living matter of this earth including man, animals, and vegetation. Industrial hygiene engineers are concerned with protecting the health and welfare of people in industry or anyone exposed to pollutants resulting from manufacturing processes and activities. Radiation protection engineers are concerned with the health and welfare of people in industry or those who may be exposed to pollutants from processing and manufacturing radioactive materials.

Solid waste and management engineers work in the field of solid waste disposal, including refuse, garbage, and sludge from wastewater treatment works. They try to prevent materials from polluting the country's surface and ground waters, land surface, and the atmosphere. Water supply and wastewater engineers are involved in the design, operation, and maintenance of public water supply purification and distribution systems used for drinking and other purposes. They are also concerned with the design, operation, and maintenance of domestic and industrial wastewater treatment works. They make certain that wastes can be discharged into a waterway or on land without being detrimental to public health and the environment.

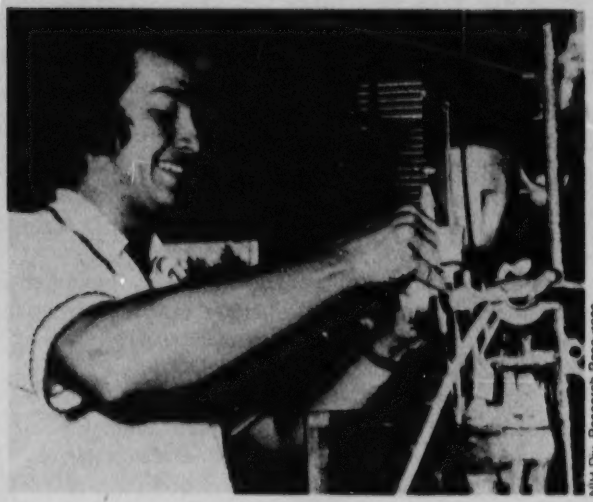
Depending on the nature and character of the project they are working on, these engineers may work indoors or outdoors, on land, the waterways and/or in the earth's atmosphere. Most projects require sophisticated laboratory and design facilities.

### Job Requirements

Preparation for entry into this field includes a 4-year course in an accredited engineering university or college, leading to a baccalaureate degree. A masters or doctoral degree in one of the specializations just described is required for higher-level positions. Usually, admission requirements for an undergraduate engineering program are extremely high, and high school graduates who are accepted are usually in the top percentile of their class. All 50 States and the District of Columbia requiring licensing for engineers whose work may affect life, health, or property or who offer their services to public. In order to become registered with a State as a professional engineer, in most States an individual must have a degree from an accredited engineering school and at least 4 years of relevant work experience, and pass an oral and written State examination, depending on educational and experience qualifications.

### Opportunities

The field of environmental engineering is only in its early stages, and future career opportunities are expected to be available for competent, qualified engineers.



NIH Div Research Resources

Advancement possibilities in this field are quite favorable, and upward mobility is generally based on experience, knowledge, education, and decision-making ability.

DOT Code: Environmental Analyst 029.081-010

For further information, contact:
American Academy of Environmental Engineers

## Environmental Health Technician

Environmental health technicians assist environmental health specialists in the technical aspects of their work. Their wide-ranging activities may include obtaining samples and specimens of air, water, and food for analysis; conducting routine inspections and field tests; and operating or assisting in the operation of water and waste-water treatment plants and solid-waste disposal facilities. Under supervision, the technician investigates conditions and recommends necessary improvements at private and semipublic water supplies, small sewage disposal works, tourist camps, resorts, swimming pools, food-handling establishments, milk suppliers, and schools. Technicians consult with public health personnel and local authorities regarding environmental health problems and their solutions. Also, technicians are sometimes asked to talk before community groups to discuss ordinary problems of environmental health.

Environmental technicians are employed by State and local health departments, air-pollution control organizations, water-purification plants, waste-water treatment plants, solid-waste collection and disposal units, radiation-protection units, consulting firms, and a variety of business and industrial firms concerned with environmental control. Like environmental health specialists, technicians perform considerable field work and may come into contact with unsanitary conditions. There are no unusual physical requirements for this job other than being in good physical condition. Since technicians must often work with different community groups, it is important for them to be able to communicate effectively and to work cooperatively with people from various backgrounds.

### Job Requirements

Since this is a relatively new field, job specifications and training programs for many of the different types of environmental technicians have not been completely worked out. As a result, people with various combinations of academic and practical training have entered the field, taking over some of the technical work that was formerly performed by the professionals but did not require full professional training. The majority of persons working as environmental technicians today have had as their preparation and background at least 2 years in a junior college or community college or technical school, with concentration on the technical aspects of the particular field they planned to enter. In some cases, technicians with less than those requirements are hired for low level duties. The 2-year program prepares environmental technicians for routine environmental surveillance and laboratory duties. Courses should include humanities, social sciences, and natural sciences, all of which are fundamental and provide the basis for continued professional studies. Comprehensive physical and biological science courses are essential.

Liberal arts courses are necessary to prepare technical personnel, who must have a knowledge of and skill in effective communication, understanding of people and their interactions, and comprehension of the levels of government and the part that each plays in the political process. In communications, recommended courses may include English composition, grammar, report writing, and speech. Social sciences may include such courses as sociology, political science, psychology, and economics.

Sciences such as physics, chemistry, mathematics, and biology are the foundation on which further technical courses are built. Most of these courses may be the same as those provided to students who plan to transfer to a baccalaureate program. Basic sciences

may include one or two courses in the areas of mathmatics (algebra, trigonometry, geometry), physics, chemistry, biology, microbiology, and/or ecology. During the first school term, potential technical students should be offered a survey course covering the broad scope of environmental protection. This kind of course will provide students with sufficient background on which to base a decision for further work in the environment. Areas of further study that may be included in the technical areas are water quality, air quality, food protection, vector control, solid waste management, shelter evaluation, industrial hygiene, noise control, radiological health, environmental planning, and accident prevention. Field training or internship is an essential part of the program.

## Opportunities

Large metropolitan areas have and will continue to have the greatest number of openings in the field. In recent years, certain program areas have been receiving greater emphasis, and consequently, greater employment opportunities have become available. According to estimates, there will not be enough trained technicians to meet the needs of the 1980's. A technician can advance to higher level duties through experience and/or education. For example, a professional position in this field requires that the individual obtain a bachelor of science degree.

| DOT Code | Pollution-Control Technician | 029.261-014 |
|---|---|---|

For further information, contact:
National Environmental Health Association
Environmental Protection Agency

## Industrial Hygienist

In years past, little could be done about industrial hazards and toxicants except to rotate workers or otherwise limit their exposure. The day-to-day exposure to harmful chemicals, dust, noise, heat, and similar conditions was simply accepted as the price one had to pay for a job in a particular plant or industry. Today, industrial hygienists, safety engineers, physicians, and other members of the industrial health team have eliminated many unhealthful conditions in industry. The industrial hygienist's task involves three interrelated functions: Recognizing hazards and detecting their development promptly; evaluating their seriousness; and prescribing methods of eliminating or controlling them. Industrial hygienists may urge drastic changes in a process or even in an entire plant where unsafe conditions are found to exist. Where necessary, they may recommend costly modification or replacement of equipment. Frequently they order substitution of less toxic materials, even at the expense of greatly increased production costs. During emergencies they may even have authority to order a shutdown of operations, when there is no time to confer with management.

Today, the industrial hygienist battles conditions that were unknown or considered of little importance just a few years ago. Radiation, fungi, air pollution, noise, vibration, poor lighting—all are considered conditions to be overcome. The industrial hygienist is also concerned with protecting the worker against discomfort, fatigue, and other influences that may contribute to low morale and inefficiency. In large organizations with full-scale occupational health programs, the overall staff is usually headed by a physician and may consist of a dozen or more persons, including industrial hygienists, chemists, physicists, bacteriologists, laboratory testers, and industrial engineers. In smaller companies, on the other hand, the hygienist may not only assume responsibility for the industrial hygiene program but may also perform other functions such as that of safety engineer or personnel officer.

Although most industrial hygienists work in industrial settings, many are employed by transportation companies and public utilities, suppliers of industrial safety equipment, State and local health departments, the Federal Government, mining companies, large agricultural operations, insurance businesses, and commercial businesses. A few are self-employed as consultants.

## Job Requirements

Persons planning careers as industrial hygienists should be interested in science or engineering and have a strong desire to apply technical knowledge in a practical fashion. A keen sense of responsibility is essential, since health, comfort, and even life may depend on a hygienist's experience and knowledge. On occasion, industrial hygienists may find themselves in the middle of a sensitive situation between management and workers—as, for example, when an unpopular or costly change in equipment or work patterns may be the only solution to a serious health problem. In such circumstances, tact and patience are essential in order to get the cooperation needed for a successful environmental health program.

The basic educational requirement for industrial hygiene is a college degree with a major in engineering or one of the physical sciences. Some students enter combined programs which require 6 or 7 years of study beyond high school and lead to a master's or doctoral degree. Combined programs are full time, with no summer vacation, and admission is usually restricted to students in the top percentile of their high school graduating class. The prospective industrial hygienist should have a strong high school background in math and science, preferably covering chemistry, biology, and physics. In college, a number of majors are available including biology and physics. Courses in biology and biochemistry are highly desirable, as are courses in psychology, personnel management, and business administration. All programs in this field combine clinical and classroom work throughout the course.

Certification is optional but desirable, and those possessing certification usually command higher salaries. Certification is obtained by passing an examination by the governing body, the American Board of Industrial Hygiene.

## Opportunities

Continued expansion is anticipated in this profession over the next decade due to increased public interest in ecology and the concern for environmental health by all levels of government. Advancement in this field is based on work experience, skill development, and completion of advanced training. Qualified industrial hygienists can advance to supervisory and administrative positions.

DOT Code: Industrial Hygienist 079.161-010

For further information, contact:
American Industrial Hygiene Association

# Medical Research Scientist

Anatomists study the form and structure of organisms, including cell structures, and the formation of tissues and organs. They teach medical, dental, and other students in the health field about body structure and functions and engage in many areas of medical research.

Closely allied with the anatomist is the physiologist. Physiologists conduct research on the functioning of body structures and parts. They study growth, breathing, circulation, reproduction, and other bodily functions under both normal and abnormal conditions. Physiologists also use complex medical equipment to perform experiments designed to increase information on life processes.

Two of the several types of specialists within anatomy and physiology are the embryologist and the endocrinologist. Embryologists study the formation, early growth, and development of living organisms. Endocrinologists may be medical doctors or scientists who study the body's glands (adrenal, pituitary, thyroid, sex glands), their secretions, their functions, and their pathology. (For more detailed information about the endocrinologist, please refer to the section on careers in medicine.)

Microbiologists study the growth, structure, development, and general characteristics of microscopic organisms such as bacteria and viruses. Their work is of vital importance in the health field since they are concerned with the ways in which these organisms enter the body and cause illness. There are several areas of specialization in microbiology. Bacteriologists, for example, study bacteria to learn about their structure, functions, reproductive cycles, chemical and physical processes. Virologists specialize in the study of submicroscopic particles known as viruses—how they originate, grow, multiply and affect living tissue and organisms. Some virologists are specifically interested in disease-causing viruses (for example, those that cause polio, mononucleosis, influenza, and measles) and in the development of vaccines against these viruses. Parasitologists specialize in research on the characteristics, habits, and life cycles of animal parasites such as tapeworms or flukes. They are primarily concerned with determining how parasites cause animal and human illness. Medical entomologists specialize in the study of disease-carrying insects and conduct research to develop methods to control or eliminate harmful insects. Immunologists study the ways in which the body defends itself against infections and attempt to develop ways of stimulating or supplementing these defenses. As a group, specialists in microbiology are responsible for many life-saving discoveries such as the Salk vaccine against polio and the identification of malaria-carrying mosquitoes. With the discovery that many forms of microscopic life can live and travel freely through outer space, these scientists can be expected to make significant contributions to human survival in space exploration.

Biologists are research scientists who study living organisms, including plants, animals, and man. Their research develops information about the origin, development, anatomy, and functions of plant and animal life. Since there are so many kinds of living organisms and ways to study them, there are many areas of specialization in biology. Some biologists work exclusively in medical research, and others undertake activities that are indirectly related to the health field. Radiobiologists, for example, specialize in studying the effects of radiation on living systems, especially man. Geneticists specialize in the study of heredity. They try to determine how a parent's genes result in a certain type of child and how genes carried in a parent can lead to such conditions as sickle cell anemia, heart disease, mental retardation, or physical deformities in a child.

Biochemists study the functioning of cells down to the most fundamental aspects—the chemical processes that go into the cell's nutrition, growth, and reproduction. They describe how these processes are disturbed by various illnesses and how these disturbances can be corrected. The entire field of nutrition—what constitutes a balanced diet, the role of vitamins and minerals, and nutritional deficiences—depends on the basic knowledge of the cell's nutritional requirements. This knowledge comes from cell biology and biochemistry.

In the same way that the biochemist makes chemistry a human science, the biophysicist is involved with the human side of physics. Biophysicists are concerned with how the body creates and uses energy; how nerve impulses are transmitted through various parts of the nervous system; how the eyes and ears receive and transmit light and sound waves; and how muscle fibres respond under various conditions. Biophysicists also do research on the functioning of the human heart and the mechanics of the circulatory system. There are different areas of specialization in biophysics. Health physicists, sometimes called radiophysicists, study the effects of radiation on living structures and tissues, and try to judge the potential hazards or benefits of exposure. Cryogenicists concentrate their research efforts on the effects of cold on the human body. Hydrophysicists study the effects of water on body tissues.

Finally, there is the pathologist, who is concerned with identification of diseases, how they occur, their symptoms, and their effects on the body and its parts. (For detailed information about the pathologist, please refer to the section on careers in medicine). Hematologists are specialists who study the nature and pathology of blood and diseases that affect the blood. Serologists are specialists in this area who concentrate their research efforts on determining the natural disease-fighting properties of blood.

Besides the purely scientific occupations just described, there are a number of essentially nonmedical careers that have medical applications.

Biomathematicians, for example, specialize in

developing mathematically valid models to explain life processes which cannot be demonstrated efficiently in the laboratory. They predict the presence of unseen substances and their relationships to living tissue for use by other bioscientists.

Biostatisticians apply statistical theories and methods to basic research problems in the health field. The information they obtain is also used in planning and evaluating health services. These research data are also used in measuring the occurrence of particular diseases and how it varies with different age or economic groups or geographic locations. When the specializations of biomathematics and biostatistics are combined, they are referred to professionally as biometrics.

Epidemiologists study all the factors which affect occurrence and course of disease in a given population. They are concerned with the biological aspects of noncommunicable and communicable disease in populations, including the environmental, social, and behavioral factors affecting health. They frequently use the knowledge of other health specialists in their work and may concentrate their efforts in one area, such as infectious diseases, tropical medicine, cancer, or mental disorders.

Health economists evaluate health as an economic asset and analyze the adequacy of health-care services provided to individuals and families and their effect on the Nation as a whole. Their work is generally concentrated in such areas as health-financing, organization of health facilities, and manpower.

Health sociologists contribute to the health field by identifying and explaining the influence of social factors on the occurrence and course of disease. They are also concerned with the social behavior of patients.

Anthropologists also make significant contributions to the field of health. Physical anthropologists study causes of physical differences in man and the effect of heredity, culture, and living conditions on the individual. Social anthropologists study cultural factors affecting personality and psychological development, mental illness, and various types of stress.

Ecologists study the effects of environmental factors such as pollution, radioactive substances, industrial development, and population growth on plant, animal, and human life.

Finally, there is a relatively new nonmedical professional whose work has an important effect on the health field—the health lawyer. Health lawyers specialize in advising individuals or groups of their rights, responsibilities, liabilities, and remedies with regard to laws in the health field. They represent the interests of patients, physicians, hospitals, nursing homes, health-maintenance organizations, and group medical practices.

Scientists in the health field work in a variety of settings. The laboratory is traditionally the workplace of the scientist, and, in fact, many scientists spend their entire careers in the world of sophisticated equipment and techniques, working either alone or as part of a research team on projects which may take years or even decades to complete. But scientists working in medical fields frequently take an active part in providing health services. The most obvious examples are scientists who work in testing laboratories where scientific data are used to investigate specific individual or environmental problems. In addition, scientists serve as members of medical teams and as medical consultants.

Research laboratories are usually connected with universities, private foundations, Federal agencies, or private industrial establishments. The Federal Government has taken an increasing interest in health-related research, through grants to universities and similar institutions and through fellowships to graduate students.

The principal Federal agency supporting health-related research and education of professionals is the National Institutes of Health of the U.S. Department of Health, Education, and Welfare. Support for special types of research, for basic science, and for the training of young scientists is also provided by the National Science Foundation, National Aeronautics and Space Administration, the Veterans Administration, and the Department of Agriculture.

Scientists and technicians, assistants and technologists who choose to investigate environmental and community health-related problems in laboratory testing services may work in Federal, State, or even local government testing laboratories. Most States and many local health departments maintain their own laboratories for these purposes. Nearly every hospital has its in-house medical laboratory, where staff carry out scientific tests on specimens from hospital patients, providing the physician with the information needed for diagnosis and treatment. Some physicians maintain small laboratory-testing facilities and staff in their offices or have medical assistants to perform the relatively routine tests. Independent local testing laboratories are often used by private physicians, as well as by hospitals, private and public clinics, and other health service agencies. These laboratories may be large or small, specializing in one area of medical-scientific in-

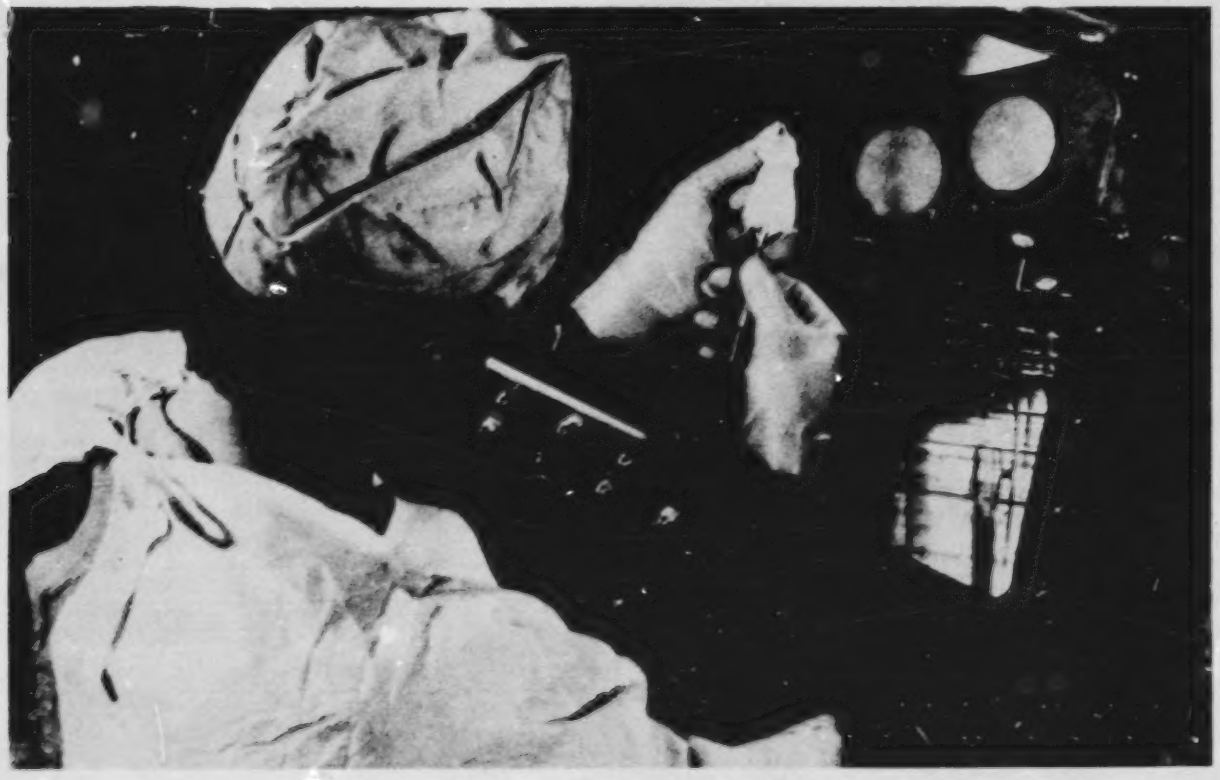
vestigation or providing a range of testing services, and can be found in nearly every community. Particular tests which are too new, expensive, or rarely needed to be done by a local testing laboratory can be taken to a central laboratory which serves an entire community or region. Central laboratories are generally located in a municipal or State health department, a Federal institution, or large hospital center. Scientists and their technical staff also work for pharmaceutical firms which maintain staff and laboratory facilities to test new drugs.

A scientist often works with medical personnel on research teams. Here the scientists have the opportunity to work with the medical staff who will eventually use the results of scientific research and development. Working together, with each specialist contributing his or her training and experience, the research team may study the causes and possible cures of cancer, develop ways of retarding or preventing aging, or be part of an effort to overcome hereditary diseases and disorders through genetic control. A single team may consist of many different scientific and medical specialists. For example, work on molecular biology and brain research may be carried out by a team consisting of physicians, surgeons, anatomists, physiologists, biophysicists, biochemists, biomathematicians and medical engineers and their various support personnel. Many of these research teams are Government-funded or funded by research foundations and are usually located in large urban medical-scientific complexes.

## Job Requirements

The best training for a science career, according to scientists and educators, is a broad-based curriculum, one that does not specialize in science and mathematics but includes courses in languages, writing skills, and social sciences. This basic training should start in high school; and a student who chooses a science major during the undergraduate years of college should also take some general course work. It is not wise to attempt to specialize too early. General courses taken in the early years provide the student with a greater understanding of the meaning of a particular field of specialization and its relation to other specializations in the vast fields of science and medicine.

The bachelor's degree qualifies the student for a job as scientific assistant. College graduates with experience can find jobs in local hospital laboratories, municipal or State public-health departments, or the laboratories of food processors or drug manufacturers. The Federal



Government also hires recent science graduates for openings in its hospitals and laboratories throughout the country.

Full professional status as a scientist requires additional training, starting with a master's degree and leading eventually to a doctorate in one of the scientific specialties. This period of graduate training, which usually lasts 3 to 4 years after the bachelor's degree, is the time when a student's specialization takes full form.

One of the advantages of following a science career is that it probably offers more opportunities than any other field for obtaining financial assistance to further advanced education and careers. Universities, private foundations, industry, and the Federal government all provide fellowships, financial grants, special student loans, and other forms of assistance to graduate science students. A graduate student can even find a part-time job as a research or teaching assistant and have the opportunity to work with professional scientific personnel on projects that provide both financial and educationl support and sound experience toward future employment. Some employers pay full or partial salaries to enable their researchers to pursue graduate studies full time or pay for evening course work at a local university while the researcher is working full time.

When medical research students complete the doctorate, they enter the scientific community as fully qualified members of a research team or organization. By the time they have completed their education, they have identified the specific research project or organization they wish to enter, from the numerous Federal, private, and educational organizations involved in research in the health fields. On entry, they will probably work on a team, under the direction of a senior scientist. With further experience and possible post-doctoral study, they should have the opportunity to conduct their own experiments, consulting with their superiors for guidance and advice. As their experience grows, so do their opportunities to take part in scientific conferences, consultations, and other activities in which ideas and findings are exchanged and information is available about other projects that may lead to funding independent research.

From this basic experience, research scientists very frequently enter into teaching in graduate or professional schools. Some who have M.D. degrees or Ph.D.'s become medical consultants, bringing the findings of science directly into the world of everyday health.

## Opportunities

Professional scientists have little difficulty in finding work in their chosen occupations, and demand for scientific professionals is usually higher than the number of graduates available. With so much public concern about the condition of our health and environment, nonprofit, government and industry-sponsored programs are created and expanded regularly. With some knowledge and exploration, a science graduate can find a choice of jobs in a variety of nationwide research organizations, scientific research units of Federal or State governments, projects conducted in colleges throughout the Nation, and in industrial firms which manufacture medical drugs or equipment.

| DOT Code: | | |
|---|---|---|
| | Anatomist | 041.061-010 |
| | Anthropologist | 055.067-010 |
| | Bacteriologist | 041.061-058 |
| | Biochemist | 041.061-026 |
| | Biologist | 041.061-030 |
| | Biomathematician | 020.067-014 |
| | Biophysicist | 041.061-034 |
| | Biostatistician | 020.067-022 |
| | Entomologist | 141.061-046 |
| | Geneticist | 141.061-050 |
| | Health Economist | 050.067-010 |
| | Health Lawyer | 110.107-010 |
| | Health Sociologist | 054.067-014 |
| | Microbiologist | 041.061-058 |
| | Parasitologist | 041.061-070 |
| | Pathologist | 070.061-010 |
| | Physiologist | 041.061-078 |
| | Serologist | 041.061-058 |
| | Virologist | 041.061-058 |

For further information, contact:
American Statistical Association
American Association of Anatomists
American Association of Physicists in Medicine
American Association of Schools of Public Health
American Genetic Association
American Institute of Biological Sciences
American Society for Microbiology

## Sanitarian

**Environmental health specialist**
**Environmental hygienist**
**Environmentalist**

The sanitarian is responsible for controlling, preserving, or improving environmental conditions so that health, safety, comfort, and well-being may be achieved for this and future generations. The sanitarian's basic duty is interpretation and enforcement of city, State, Federal, or other laws regarding sanitary standards, in food, water supply, garbage disposal, sewage disposal, and housing maintenance. Today, sanitarians have moved into many new types of positions and have assumed expanding roles within the field of environmental health. Sanitarians play an important role in obtaining community action for better health through environmental health control. They are in a position, for example, to promote and help to secure such improvements as water supply extension, improved sewage disposal, safer recreational areas, and more hygienic conditions in nursing and convalescent homes. In addition, they must be alert to the host of new sanitary problems created as the population increases and as more and more people move into the cities and suburbs of expanding metropolitan areas. With technical training and experience, sanitarians are equipped to recognize and anticipate sanitation hazards. It is part of their responsibility to call these problems to the attention of the government bodies concerned, community leaders, civic groups, and the general public and to make recommendations for solving these problems.

Sanitarians collect samples and specimens for laboratory analysis and perform a variety of field tests, using sampling equipment. They also conduct environmental health inspections, which involves going to food establishments, schools, hospitals, swimming pools, motels, parks, and many other locations to determine compliance with public health laws and regulations. Sanitarians then evaluate their findings and make recommendations to those concerned. Sanitarians also plan and conduct environmental health investigations and review and evaluate documents, license applications, and planning specifications. Sanitarians frequently provide consultive services relating to enviromental health problems to owners, operators, employees, contractors, school officials, government officials, hospital administrators, and others regarding environmental health equipment and related problems.

Sanitarians having supervisory duties analyze reports of inspections and investigations made by other environmental health specialists and advise on difficult or unusual sanitation problems. They conduct investigations and give evidence in court cases involving public health regulations. In addition, they promote health laws and engage in health education activities. Those in top management positions are involved with planning and administering environmental health programs and coordinating them with programs of other agencies. Other duties may include advising government officials on environmental health matters and drafting health laws and regulations. In many large local, State, and Federal agencies, sanitarians may become specialists in particular areas of work. They apply their skills in such areas as food and drug inspection, occupational health and safety, air and water pollution, institutional sanitation, insect and rodent control, refuse and waste control, housing inspection, land use and noise control, hazardous substances and product safety, and radiation safety. Sanitarians who work in rural areas and small cities do not usually specialize in one area and are often responsible for a wide range of environmental health activities.

The field of environmental health is very broad and offers a variety of work locations. Sanitarians work in various local, State, or Federal governmental health or protection agencies, as well as in private industry or other locations such as hospitals, universities and colleges, food manufacturing plants, and insurance companies. There are specific program areas which require considerable field work, travel, and possible contact with unsanitary conditions. Sanitarians usually work a 40-hour week, and generally there are no specific physical requirements for successful performance in this work.

## Job Requirements

A bachelor's degree in environmental health is the preferred preparation for a beginning job as a professional sanitarian, although a bachelor's degree in a basic science generally is acceptable. High level positions usually require a graduate degree in some aspect of public health. In most States sanitarians cannot practice without a bachelor's degree. For a bachelor's degree in environmental health the individual must have a minimum of 30 semester hours in the physical and/or biological sciences. Science courses recommended by the National Environmental Health Association during the first 2 years of college are basic courses in the physical and biological sciences. Courses in communications including English, writing, public speaking, and graphics are also recommended. In the second 2 years, the recommended program includes advanced courses in microbiology, chemistry, and physics. Over 60 colleges and universities offer undergraduate and graduate degrees in environmental health.

Within the United States, registration is required in 35 States and licensure is required in one. To obtain State registration, the individual must meet specified educational requirements, have 1 to 2 years of work experience, and pass a written and/or oral examination. Since the requirements for registration vary considerably throughout the country, the appropriate State agency should be contacted for specific information. National certification is available through the National Environmental Health Association. This usually consists of a written examination administered by the Association, and those who qualify are designated as R.S. (registered sanitarian). However, individuals possessing National certification must still conform to State regulations concerning registration. Professional certification is also available from the American Academy of Sanitarians (AAS). Certification as a diplomate in the academy is based on educational, leadership, experience standards, and successful completion of an examination.

## Opportunities

Graduates of various schools offering environmental health studies are flooding the traditional locations of employment, namely, local, State, and to some degree Federal health agencies. However, program areas such as occupational health and safety and institutional environmental health have recently received great emphasis and will provide greater employment opportunities in the future. Larger metropolitan areas will continue to offer the greatest number of openings.

Advancement possibilities in this field are generally good. Qualified sanitarians can move into supervisory or administrative jobs, or take teaching or research positions. They can also advance to higher levels within a position by assuming more complex tasks and responsibilities.

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DOT Code: Sanitarian 079.117-018

For further information, contact:
National Environmental Health Association
Association of Schools of Public Health
Environmental Management Association
Environmental Protection Agency

Social Work

Health has been defined as not merely the absence of disease but as a condition of complete physical, mental, and social well-being. The effect of social, economic, and environmental factors on an individual's state of health is an accepted fact, and recent studies reveal a definite relationship between these factors and the occurrence of disease. Recognizing this, health officials are placing increasing emphasis on the psychological as well as the clinical treatment of patients in health facilities. Very often, a patient's restoration to and maintenance of health is influenced by factors beyond the control of doctors. Some of these factors, however, can be dealt with by other professionals, including the competently trained social worker.

Social work in the health field involves programs and services that meet the special needs of the ill, disabled, elderly, or otherwise handicapped. Social workers deal with the total emotional, social, cultural, and physical needs of patients in whom the effects of illness go far beyond bodily discomfort. Illness invariably results in emotional stress and often causes significant changes in the lives of patients and their families. Medical care alone, even if it is of the highest quality, is often not sufficient. Social workers help patients and members of the health team to deal with these problems by providing a skilled appraisal of the source and significance of social, emotional, environmental, and economic factors affecting health. Their efforts with individual patients or groups of patients help to bring about constructive and meaningful changes in terms of total health. The following pages discuss social work and its various areas of specialization in health-related activities.

## Social Service Assistant

Social service assistants, under the supervision of professional staff, work to meet the needs of patients and their families. They serve as a link between professional social workers and people in need and help to make services available to a greater number of people. They interview clients and family members, assist them in obtaining community-support services, and generally provide those services which do not require professional skills or knowledge.

Specifically, duties may include explaining the services and facilities of a particular agency, helping individuals to fill out forms, or visiting clients at home to obtain required information. Social service assistants may also perform a variety of clerical tasks such as maintaining files and records on clients and checking documents such as marriage licenses or birth certificates to determine if the client qualifies for agency services.

Most social service assistants work for government agencies, in most cases at the State and local level. They are also employed by community organizations, welfare and social-service agencies, and rehabilitation agencies.

### Job Requirements

There are no specific educational requirements for this work beyond completion of high school. However, in some cases, employers require a 2-year associate of arts (AA) degree in social or human services.

Persons considering this work must like working with different types of people, be able to act as part of a team, and have a genuine desire to help others. They must be able to communicate, both verbally and in writing, and have the capacity to learn the basics of human behavior and methods of using social institutions to the advantage of the client.

### Opportunities

Prospects for employment as a social service assistant are generally favorable. This outlook is based on the continuing trend in this country of providing expanded services to those who are poor, disabled, or unable to function without assistance. As these programs increase in size, the assistant will assume a larger role in providing supportive services to professional social workers, leaving them free to serve a greater number of clients. Social service assistants can advance in this field through work experience, on-the-job training, and completion of advanced education courses. Generally, the first goal of most assistants is to become professional social workers, and many pursue studies leading to a bachelor's degree in social work (BSW), which is the first professional level.

DOT Code: Case Aide 195.367-010

For further information, contact:
National Association of Social Workers
Council on Social Work Education

## Social Worker

Patients are not just "cases"—they are people. Family, job, living arrangements, and money problems are only a few of the parts of daily living that are present in illness and in health. Often they take on added importance in time of illness. In many families, the close ties of love and courage are the greatest source of strength. But sometimes the pressures that come from family strain or outside circumstances are a part of the cause of the illness itself. Almost always, they have a direct effect on convalescence, and if illness results in serious and prolonged incapacity, it disrupts home, job,

and the whole pattern of living. Then anxieties can be so severe as to make a bad matter very much worse. Most people and most families can adjust to the problems associated with illness. But more often than we realize the problem is too much for them to manage unaided. They need professional help, and the social worker is a skilled specialist in giving this kind of help.

Social workers, whether in a hospital, nursing home, out-patient clinic or other health setting, are responsible for helping patients and families to cope with problems resulting from severe or long-term illness, recovery, and rehabilitation. Through their understanding of the social and emotional factors related to the patient's problems they are able to assist physicians and other health workers in patient-evaluation and treatment activities. There are no standard work activities for social workers since their duties vary with the places they work. However, duties common to most workplaces include conferences and discussions with physicians and other medical staff and constant personal contact with patients, families, and community agencies, or other health resources. In addition, they are often involved in the preparation of psycho-social patient histories and participate in health-team conferences. There are many social workers who, through professional education and experience, become specialized in the health field, both in medical and psychiatric services. They are skilled in applying professional knowledge to the complex situations people meet when illness strikes. Together with the physician, they can help people make the most of family stability and strength and can also help them with problems when a solution of these difficulties is an essential part of recovery. Three examples of specialization are the medical social worker, psychiatric social worker, and clinical social worker.

The medical social worker is skilled in helping a patient and family handle personal problems that result from severe or long illness or disability. The problem may be social, emotional, of financial—or all three. But, whatever its nature, it can be severe enough to slow the recovery and lengthen convalescence. The patient who makes the best response to medical treatment is usually the one whose mind is at ease. Therefore, services of the medical social worker are an essential part of the patient's total treatment. A patient may be concerned about losing his job because his heart condition makes it impossible for him to continue carrying heavy loads. The medical social worker can help in selecting a job which is satisfactory and which the physician agrees will not be too much for the patient. "I can't sleep for worrying about where the children can live," says a hospitalized mother. Again, this is a problem for the medical social worker who knows the family circumstances. Other problems this worker deals with may be the person who lives in a boarding house and has to begin following a special diet, or children crippled by polio, whose family must learn to treat them as "regular" family members. Illness makes the average person's problems seem bigger. But they often are bigger—and may be of crisis proportions. The medical social worker and the patient, and often the family, together think through all angles of the problem to be tackled. This may include not only immediate needs but also plans for convalescence. These are all human problems—all requiring tact and talent in human relations, professional skill, and judgment. And there is no magic formula.

Social workers are trained to understand people and their personal and social needs, and medical social workers give particular attention to these needs and the related problems associated with illness and disability. They know that everyone reacts to trouble differently. Some people withdraw, some become irritable. Even if the patient remains calm, however, help may still be required. In recent years there has been a trend to get patients out of hospitals and into familiar surroundings. The social worker has become an important link for the patient between the hospital and return to normal life in the community. Along with an understanding of human nature, social work requires a thorough professional knowledge of all the community resources that can be used in order to assist the individual, and a thorough familiarity with the community and its social issues.

Preparing a history of each new patient is only the first duty of psychiatric social workers in mental hospitals. Since the patient hospitalized for mental illness sometimes requires months and even years of treatment, it is the social worker's job to serve as a continuing contact point between the patient and family. The social

worker also serves as the link between the family and the psychiatrist, seeking out and passing along any information from the family that might be helpful in treatment.

For the hospitalized patient who recovers and is getting ready to go home, the psychiatric social worker paves the way for a smooth return to family and community life. The social worker has become an important link for the patient between hospitalization and return to normal life in the community. If the patient needs assistance in adjusting to the outside world, it is the psychiatric social worker who keeps in touch and gives needed support. People with mental or emotional problems usually have family, job, or financial problems, too. The specialized training of the psychiatric social worker provides insight into these problems and interrelationships in the total picture of the patient's illness. Generally speaking, the psychiatrist calls on the social worker to join in helping the patients overcome their problems, and, at the same time, conquer the fears, worries, and prejudices that slow their recovery. Besides serving in mental hospitals and mental health clinics, psychiatric social workers also serve in child guidance clinics. Here, they help psychiatrists work with children who have personality difficulties or behavior problems and with their parents and teachers. Other opportunities for practice in this field are in general hospitals that have psychiatric services; in hospitals for the retarded and epileptic; in Federal hospitals providing psychiatric care; and in courts, community centers, and rehabilitation organizations.

Clinical social workers provide diagnostic, preventive, and treatment services directly to individuals, families, and groups whose ability to function is affected by social, psychological, or health problems. These professionals are qualified to offer these services because of the extensive educational and experience standards which are required for practice.

## Job Requirements

The successful medical social worker needs a special combination of personal qualities. Good judgment and the capacity to stand off and look at all sides of human problems are as important as warmth and sympathy. The profession demands a genuine liking and respect for people and faith in them. Of special importance to the medical social worker is the ability to work as a member of a team. The skilled practice of medical social work requires the highest quality of professional preparation; a medical social worker must have a bachelor's degree from an accredited college or university. There are over 200 accredited colleges and universities in the United States and Canada, offering undergraduate programs in social welfare to prepare students for direct entrance into social welfare employment or for graduate education. Graduate social workers can attain master's degrees upon completion of a 2-year program at any of many accredited colleges and universities in the United States and in Canada. About one-third to one-half of the semester hours are in field instruction that relates academic work to practical experience. Preparation for a career as a clinical social worker includes a master's or doctoral degree in social work, plus 2 years or 3,000 hours of postgraduate supervised clinical social work practice. Programs for the doctoral level are available in many accredited colleges and universities in the United States and in Canada. A doctoral degree is required for university teaching, advanced practice, policy formulation, and administration.

Courses vary from school to school, but all accredited programs cover five major areas of knowledge: human behavior and the social environment; social welfare policy and services; methods of social work (the process of intervening in the flow of events to help solve a problem or develop a resource); research; and direct service (field practice). The Council on Social Work Education is the accrediting agency in the United States and Canada for social work education. At present, there are 21 States with requirements for either licensing or registration. The National Association of Social Workers certifies social workers who have a master's degree, 2 years of postgraduate work experience, and qualify on a written examination. Persons who meet these requirements are permitted to use the designation of ACSW (Academy of Certified Social Workers). Appropriate State licensing agencies should be contacted for current information regarding requirements and standards.

## Opportunities

Employment prospects for social workers are expected to remain generally favorable through the next decade. This outlook is based on the trend toward expansion of community and mental-health programs and growth in social work activities in such areas as drug and alcohol abuse.

Advancement in this field is based on work experience and advanced training. Persons with a master's degree in social work (MSW) or a doctorate degree can advance to supervisory, administrative, and policymaking positions.

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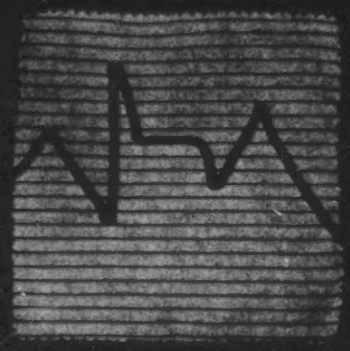
|---|---|---|
| DOT Code: | Social Worker, Medical | 195.107-030 |
| | Social Worker, Psychiatric | 195.107-034 |

For further information, contact:
National Association of Social Workers
Council on Social Work Education

Technical Instrumentation



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New and improved instrumentation is developed every year to save patients' lives through earlier diagnosis and more effective treatment of disease and by taking over body functions when organs fail or no longer work efficiently, or when defects are being surgically repaired.

This improved instrumentation requires new techniques and trained workers. Although these workers report to physicians, they must nevertheless be capable of making quick, independent decisions, as they monitor and work with the equipment on which patients' lives may depend. Careers and preparation for these jobs will be discussed in detail. Briefly, however, the jobs fall into three broad categories that correspond to the types of machines used for purposes of diagnosis, maintenance of body function outside of the body, and treatment.

Instrumentation usually used for diagnostic purposes requires the services of radiologic technologists, electroencephalographic technologists and technicians, nuclear medicine technologists, and diagnostic medical sonographers.

Radiologic technologists take X-rays which physicians use as aids in the diagnosis of many kinds of medical problems.

Electroencephalographic technologists and technicians measure and record brain waves which may show the presence of tumors or other brain diseases or which help in judging the effects of head injuries.

Nuclear medicine technologists use radioactive materials and drugs in diagnosis of disease or malfunction in many organs, glands, or body systems.

Diagnostic medical sonographers employ a sound wave technique somewhat like sonar to obtain visual information about problems as different as internal fluid accumulation, abnormal growths, or positioning of a developing child in the mother's body.

Instrumentation technologists monitor and use equipment designed to carry on body functions outside of the patient's body (extracorporeal machines). They include dialysis technicians and perfusionists.

Dialysis technicians operate an extracorporeal machine, which takes over kidney function for patients whose kidneys function poorly or not at all or for patients undergoing certain types of surgery.

Perfusionists are also extracorporeal machine technologists who use a heart/lung machine to take over for the patient's own blood circulation during open-heart surgery.

Other treatment with technical instrumentation may involve the work of radiation therapy technologists, respiratory therapists, and respiratory therapy technicians.

Radiation therapy technologists use radiation for treatment of patients who usually have some type of malignancy.

Respiratory therapists and respiratory therapy technicians treat patients with breathing difficulties, some of which may be associated with lung and/or heart problems. The machines and equipment these workers use help the patient to breathe; completely take over breathing functions; or are used to relieve difficult breathing with special medications, gases, or oxygen in different combinations. Intermittent positive pressure breathing (IPPB) machines, oxygen tents, and respirators are examples of this equipment.

Detailed descriptions of these careers follow.

## Cardiology Technologist/Technician

**Cardiac catheterization assistant/technician**
**Cardiovascular technologist/technician**
**Echocardiogram technician**
**EKG/ECG technician**
**Electrocardiograph technician**
**Holter monitoring technician**
**Phonocardiograph technician**
**Stress testing technician**
**Vectorcardiograph technician**

Cardiology technologists perform diagnostic cardiac (heart) testing under a physician's supervision.

Because of rapid technical advances in this field, the use of the job title, "cardiology technologist," and the tasks performed by these workers are not standardized throughout the country. Many new diagnostic tests which help detect cardiac problems are now available. Some workers perform only one cardiac test, while others perform several. Often the job title corresponds with the test.

The most familiar test is the electrocardiogram (EKG); hence the job title EKG technician. Before the test, the equipment and the patient must be prepared for the examination. The technician attaches electrodes to the patient's chest, arms, and legs and then moves the chest electrode to successive positions across the patient's chest to obtain several different records of heart action on the EKG machine.

New tests include phonocardiography, which picks up and identifies abnormal heart sounds and murmurs; vectorcardiography, a special recording of the heart's

electrical activity; Holter monitoring, a special 24-hour electrocardiogram test; stress testing that records heart action during physical activity; and echocardiography, which uses ultrasound to see the heart chambers and valves. (See also diagnostic medical sonographer).

These tests are medically classified as "noninvasive" because during testing no foreign object or substance enters the patient's body. More complicated "invasive" tests are sometimes used to diagnose problems of the cardiovascular (heart and circulatory) system.

During a cardiac catheterization, a frequently performed invasive test, a physician, assisted by a technologist whose job title may be a cardiovascular or cardiac catheterization technician, carefully inserts a tube (catheter) through the patient's vein into the heart in order to obtain special diagnostic information. (See cardiopulmonary technologist).

To perform or assist in any cardiac test, technologists must be familiar with both the equipment used and the procedure. During the exam, they monitor the machine and the patient and must be able to recognize machine malfunction as well as any abnormal conditions in the patient, such as a heart attack, which may require immediate medical attention. After the cardiac test is completed, a physician interprets the test results.

Technologists may also be responsible for scheduling appointments, typing doctors' diagnoses, maintaining patients' files, and caring for equipment.

Technologists are employed in health facilities which use cardiac equipment, primarily hospitals and clinics. A 40-hour workweek is usual. In many hospitals, evening and weekend work, on a rotating basis, may be required.

## Job Requirements

Job requirements are not standardized and are determined by each employer. Traditionally, most people working in cardiac testing have been trained on the job (OJT). In general, a trainee position to perform noninvasive tests requires, as a minimum, a high school education. Some college, with an emphasis on science and/or related work experience, is usually required to qualify for OJT in invasive testing.

NIH Div. Research Resources

Length of training varies also. Three to six months of OJT is generally required to become proficient in one noninvasive test. Training covers the fundamentals of equipment operation and maintenance; basic heart and chest anatomy; electrical safety; and emergency first aid, including cardiopulmonary resuscitation. Competency in additional tests requires more OJT.

Invasive procedures require even more extensive training, usually from 6 to 12 months. Training includes greater indepth study of normal and abnormal cardiovascular anatomy and physiology.

Some hospitals, community colleges, universities and technical institutes have started formal education programs leading to the certificate or an associate degree in cardiology technology. Programs usually require a high school diploma for admission and combine education and clinical experience in a 1- or 2-year educational program. On graduation, students are prepared to work in the cardiac laboratory, performing most or all of the noninvasive cardiac tests. A few programs also offer training in invasive testing procedures.

At the present time there is no licensure in this field. However, voluntary certification is available through the American Cardiology Technologists Association (ACTA) and the National Society for Cardiopulmonary Technology (NSCPT). Individuals who pass the ACTA examination are known as registered cardiology technologists (RCT's). Persons completing the NSCPT examination use the designation registered cardiovascular technologist (RCVT). Although certification is not required for employment, most employers prefer to hire certified professionals.

## Opportunities

With the increasing reliance on cardiac tests to diagnose heart and circulatory disease, the employment outlook in this field should be good in the years ahead. Advancement opportunities are generally limited to learning and performing more complicated cardiac procedures or being promoted to a supervisory position within the cardiac department.

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DOT Code: Electrocardiograph Technician 078.362-018

For further information, contact:
American Cardiology Technologists Association
National Society of Cardiopulmonary Technology, Inc.

# Cardiopulmonary Technologist/ Technician

**Cardiopulmonary function technologist/technician**
**Cardiovascular technologist/technician**
**Physiologic technologist/technician**
**Pulmonary function technologist/technician**
**Pulmonary technologist/technician**

Cardiopulmonary technologists perform, under a physician's direction, a wide range of diagnostic tests, both invasive and noninvasive, of the pulmonary system (lung) and the cardiovascular system (heart and circulation). During an invasive test a foreign substance, such as chemical dye, or a foreign object, such as a tube, is introduced into the patient's body. These tests help physicians evaluate how well the heart and lungs are functioning and determine the presence and extent of disease. In addition to diagnostic testing, technologists may also assist in treatment or rehabilitation procedures of patients with heart and/or lung disease.

Cardiovascular procedures which technologists may perform are described in the career brief, *Cardiology Technologist*. Pulmonary tests are described in the career brief, *Respiratory Therapist*.

Though cardiopulmonary technologists are trained in both areas, they may specialize in either cardiovascular or pulmonary areas. In the pulmonary area, the chief distinction between cardiopulmonary technologists and respiratory therapists lies in the emphasis of their work. Cardiopulmonary technologists do diagnostic testing, while respiratory therapists are more involved in the therapeutic (treatment) aspect of pulmonary technology.

During cardiopulmonary procedures, technologists carefully monitor the patient and equipment and must be able to recognize any machine malfunction or abnormal reaction in the patient—such as a heart attack or respiratory failure—which may require immediate medical attention. Before performing some procedures, technologists may be required to take patients' medical histories and draw blood samples.

Although physicians are responsible for interpreting the diagnostic test results, technologists must often make preliminary analyses of test data and present these findings to physicians.

Cardiopulmonary technologists are employed in health facilities that use cardiopulmonary equipment, generally in hospitals and clinics. Some physicians' offices and industrial facilities also employ cardiopulmonary technologists. A 40-hour workweek is

usual. In large hospitals evening and weekend work, on a rotating basis, may be required.

## Job Requirements

Until recently, cardiopulmonary technologists received their preparation through military training programs or through on-the-job training.

Although OJT is still being conducted in some health facilities, formal education programs are now available and are recommended because they offer students the greatest opportunities for eventual career advancement. Formal education programs include post-college training in medical centers, 2-year community college programs leading to an associate degree, or 4-year bachelor degree programs in universities.

Programs include course work in the basic sciences: physics, math, chemistry, anatomy, and physiology. The specialized curriculum covers cardiovascular pharmacology, medical electronics, basic medical instrumentation, fundamentals of pulmonary and cardiovascular physiology, and the application of technology to these areas. In addition, 1,000 hours of intensive clinical experience in cardiopulmonary technology are required. The National Society for Cardiopulmonary Technology, Inc., accredits educational programs in this field. Qualifications necessary for OJT, where available, are determined by the hiring institution. In general, a high school education is the minimum requirement. However, some college, with a background in science, is preferred.

At the present time, there is no licensure required for employment as a cardiopulmonary technologist. The National Society for Cardiopulmonary Technology cer-

tifies, by examination, persons working in this field. After receiving basic certification as cardiopulmonary technologists, persons are eligible to sit for a more intensive registry examination in cardiopulmonary technology or its specialized areas, cardiovascular technology or pulmonary technology.

Upon successful completion of the registry examination, technologists may use the designation: R-CPT (registered cardiopulmonary technologist), R-CVT (cardiovascular technologist), or R-PUT (registered pulmonary technologist). Although certification is not employment, most employers prefer to hire certified technologists.

### Opportunities

The outlook for the future is promising. Cardiopulmonary laboratories are being established in many institutions which have not used this technology in the past, creating a need for educated and experienced technologists. There is currently a shortage of trained, qualified personnel in this field.

For further information, contact:
National Society for Cardiopulmonary Technology, Inc.

## Diagnostic Medical Sonographer

### Ultrasound technologist

Diagnostic medical sonographers use complex equipment to direct high frequency sound waves into specific areas of the patient's body to obtain visual information about internal organs, development of the fetus in the mother's body, fluid accumulations, or masses. The "echo" information, which results from the "bounce-back" of sound from the areas being scanned, is viewed on a screen and may be automatically recorded on a printout strip or photographed from the screen for permanent records and for use in interpretation and diagnosis by physicians or doctors of osteopathy.

Sonographers select equipment appropriate for use in ultrasound tests ordered by physicians. They also check the patient's other diagnostic studies for information. Sonographers explain the procedure, record any additional medical history considered necessary, and then position the patient for testing. Viewing the screen as the scanning device is moved over the patient's body, sonographers must be able to recognize subtle differences between healthy and pathological areas, to check for factors such as position, obstruction, or change of shape; and to judge if the images are satisfactory for diagnostic purposes. A high degree of technical skill and knowledge of anatomy and physiology are essential to recognize the significance of all body structures present in the ultrasound image.

The duties of medical sonographers may include recording and filing the results of sonography, evaluating new equipment and products for possible future use, and developing new techniques. Diagnostic medical sonographers often maintain libraries of books and journals on ultrasound testing and maintain logs containing evidence of ultrasound findings. They must also keep informed of new techniques and information in the field by attending conventions and discussion sessions.

Sonographers work in health facilities (hospitals, clinics, doctors' offices) in cities and rural communities. They may work alone or with others in a laboratory or at the bedside of critically ill patients.

The nature of the work usually requires close contact with patients and their families, physicians, and other health personnel. A 40-hour workweek is generally the rule, but sonographers may have to stay at work or return at times to conduct emergency procedures.

Sonographers should have good vision to observe and study ultrasound images, enough strength to lift and position patients, and the ability to sit or stand while performing their work.

Diagnostic medical sonographers may specialize in certain types of diagnostic sonography by acquiring an in-depth knowledge of the physiology, anatomical characteristics, abnormalities, and diseases of organs and body systems. Sonographic specialists include the following:

- Echoencephalographers do brain testing.
- Echocardiographers use sonographic testing techniques for the heart.
- Abdominal sonographers are concerned with abdominal testing.
- Obstetrical/gynecological sonographers perform diagnostic ultrasound procedures on the pregnant and nonpregnant uterus.
- Ophthalmic sonographers are concerned solely with the eye.
- Doppler technologists use ultrasound testing on blood vessels near the surface of the body.

### Job Requirements

Because the field is new, there are no accredited programs at present. However, the American Medical

Association, in cooperation with other professional associations involved in ultrasound, is developing educational guidelines for training programs, which should be available in the near future.

In the past, most sonographers were trained on the job. However, this no longer is true. Formal training programs from 1 to 2 years long are offered by hospitals, colleges, and universities. Admission requirements vary. High school education is the minimum; however, the majority of programs require 2 years of college or education in another branch of allied health science such nursing, radiologic technology, or respiratory therapy. A good background in the sciences is essential at a high school and college level. Upon completion of a training program, students are awarded a certificate or an associate or baccalaureate degree. The American Registry of Diagnostic Medical Sonographers certifies by examination persons working in this field. In general, to qualify for the examination a sonographer must have completed 1 year of formal training and meet other educational and/or experience requirements. Those successfully completing the examination are known as registered diagnostic medical sonographers (RDMS).

## Opportunities

Advances in medical knowledge and the constant expansion in hospital health services are creating an ever-increasing demand for the technical service of well-trained diagnostic medical sonographers. It is estimated that in the next 10 years the need for these workers will be 10 times as great as it is now and that employment will be available in both rural and city areas. Sonographers may advance from staff sonographer specializing in one or more techniques, to supervisor or instructor, clerical coordinator and/or educational coordinator, depending on additional education and greater skill achievement.

DOT Code: Ultrasound Technologist 078.364-010

For further information, contact:

The American Society of Ultrasound Technical Specialists

# Dialysis Technician

**Dialysis technologist**
**Hemodialysis technician technologist**
**Nephrology technician technologist**
**Renal technician technologist**

Kidneys filter out all waste products which collect in the blood stream. If the kidneys stop working, the individual does not function normally, unless the waste products are removed from the blood. In the past, kidney failure always resulted in death; but since the early 1960's, many patients have been saved through dialysis, a method which uses a machine to remove these wastes artificially.

Duties of dialysis technicians vary from employer to employer. Generally they work under the supervision of a nurse skilled in care of kidney problems. Their duties include patient care and responsibility for equipment. After placing necessary supplies and equipment at the patient's bedside, they rinse and add fluids to the dialyzer, attach and install pumps and tubing, connect and position the dialyzer, and set the controls. Before treatment begins, technicians weigh the patients, take vital signs (heart rate, blood pressure) and take blood samples to determine blood-clotting time. When necessary, technicians adjust the dosage of anti-clotting drugs according to a prescribed formula.

During dialysis, technicians must observe both the patient and the equipment for problems and emergencies. If any occur, technicians may have to take appropriate action, according to standard procedures. After treatment is completed (4 to 6 hours), technicians clean the patient's dialysis access site (place of attachment) and put a clean dressing on it; then they clean and sterilize the dialysis machine and all equipment and prepare for the next patient.

Dialysis technicians are employed in hospitals or ambulatory facilities.

These technicians must work well with both patients and coworkers and be patient, considerate, and helpful. They must display manual dexterity, understand the need for maintaining sterile technique, and be able to react quickly in emergencies.

There are few specializations for dialysis technicians. However, in some facilities, technicians may be responsible for only one aspect of dialysis, such as equipment maintenance and general work in the dialysis unit.

## Job Requirements

Most technicians are trained on the job, and this training combines classroom and clinical work ex-

perience. A basic training program includes patient-care practices; principles of dialysis-therapy treatment; elementary human anatomy and physiology, with special emphasis on kidneys and kidney abnormalities; sterilization techniques; and emergency procedures, including cardiopulmonary resuscitation (reviving heart-lung function).

Three to six months of closely supervised on-the-job training are usually required before a technician can perform with minimum skill in an outpatient dialysis setting. For work in-hospital with acutely ill patients, 1 year of training is generally required.

Many employers prefer to hire persons who have had previous patient-care experience and/or a background in the biological sciences. Many persons hired as trainees are licensed practical nurses or ex-military medical corps personnel. Employers also look for trainees who are emotionally mature, since dialysis is an emotionally demanding profession. Dialysis patients are in a chronic life-threatening situation. The technician must be psychologically equipped to deal with this situation on a regular basis.

Licensing is not available in this field, but there is a voluntary certification program administered by the Board of Nephrology Examiners, Nursing and Technology. To take the written examination, an individual must be currently employed as a dialysis technician, have 1 year of work experience, and submit appropriate letters of recommendation. On successful completion of the examination, a technician is known as a certified dialysis technician (CDT). Since most training is on the job, certification is not necessary for employment. However, it may be highly desirable when changing employers.

## Opportunities

Federal money currently pays for 80 percent of all dialysis care. If this funding continues, the future employment outlook in this field should remain excellent.

Despite advances in organ transplantation, the number of patients receiving dialysis has not decreased. Each year about 10 percent of the patients suffering from kidney disease can no longer be maintained by diet and drugs and must receive dialysis treatment. Because of sophisticated diagnostic techniques and increased longevity, it is probable that the number of patients requiring dialysis will increase.

The employment turnover rate among dialysis technicians is similar to that of other critical care disciplines. The chief reasons for this are the demanding nature of the work and the lack of clear advancement routes within the field. In some cases, a technician may advance to chief technician responsible for supervising the technical aspects of dialysis treatment within the unit. But, in general, overall dialysis supervision is the responsibility of the nephrology nurse. Technicians with demonstrated experience and aptitude within the field may advance by taking care of more complicated patient cases, becoming responsible for almost all parts of a dialysis program, or moving into administrative management of the dialysis unit. Opportunities also exist for technicians within industry, either in sales or research.

DOT Code: Dialysis Technician 078.362-014

For further information, contact:

The American Association of Nephrology Nurses and Technicians

# Electroencephalographic Technologist

### EEG technologist

Electroencephalographic technologists use equipment (electroencephalograph) to measure and record the brain's electrical activity (brain waves). This type of testing can be used by physicians to diagnose brain tumors, epilepsy, or stroke and to judge the effects of head injuries or of diseases on the brain. It can also be used to detect conditions which cause learning difficulties or personality problems, or to assist in determining if a person is dead, before permission is given to remove organs for use in transplants.

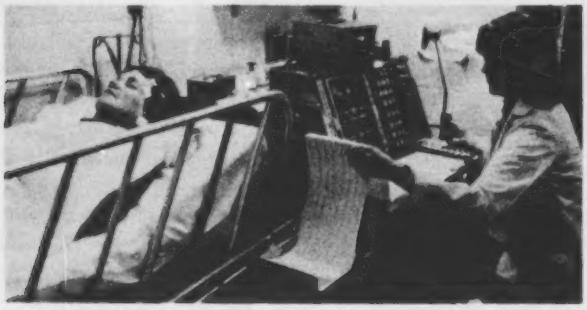
EEG technologists take a medical history of the patient, explain procedures, attach electrodes to the patient's head, and use the EEG equipment as it applies to the patient's specific problem. While the EEG recording is made, the technologists observe the patient and keep a record of behavior. It is important that technologists understand the meaning of the tracings (brain-wave record) that result, so that any false recording due to faulty technique or machine error can be corrected. The patient's and technologist's safety must also be considered when other electrical-recording devices are in use at the same time. Special techniques are sometimes used, for example, when electrodes are implanted in the brain (by a qualified physician) or for cerebral-silence (brain death) recording used in determining the death of a patient. When the EEG tracing is completed, technologists prepare a descriptive report of the tracing for the doctor.

Other responsibilities of EEG technologists may include coping with medical emergencies when they arise, supervising the laboratory, preparing appointment schedules, and ordering supplies.

EEG technologists work in hospitals, private laboratories, clinics, and physicians' offices. Their work is usually done in a laboratory setting. Their workweek is usually 40 hours, but in some hospitals they may have to be on standby emergency service for evenings, weekends, and holidays.

EEG technologists must be skilled not only in using their hands when applying electrodes or repairing equipment but also in observing and handling people who are needlessly worried about equipment in use, who suffer from mental disorders, or who require special care (babies and small children).

Experienced and capable EEG technologists work in jobs which require different abilities. Some work in technician-training programs or in teaching other hospital personnel. Some are involved in medical research or work with a highly specialized team which does neurosurgery (surgery on the brain and nervous system).



### Job Requirements

High school graduation or equivalent is required. Math and science courses and high marks are all useful for entry into classroom training programs and supervised laboratory practice. Programs for electroencephalographic technologists are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

There are 1- and 2-year programs which include classroom and supervised laboratory practice. Courses are given in neurology, anatomy, neuroanatomy and physiology.

### Opportunities

New laboratories are being opened and existing laboratories are expanding as a result of the public's health consciousness and also of prepaid health programs. Therefore, more EEG technologists are needed. Registered technologists will have the best employment opportunities because registration shows that these technologists are well-qualified.

DOT Code: Electroencephalographic Technologist 078.362-022

For further information, contact:

The American Society of Electroencephalographic Technologists

## Electroencephalographic Technician

**EEG technician**

Electroencephalographic technicians work under the supervision of both the technologist and physician. Their duties are similar to those of the technologist but require less experience and judgment. Technicians work in the same places and under the same conditions as technologists but training for the EEG technician lasts only 6 months. Registration is not available to them. The technician level is the first step in the ladder of advancement. With additional training and experience, the technician can become a technologist and can obtain registration. Further advancement and opportunity for employment are the same as for technologists. Programs for electroencephalographic technicians are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

DOT Code: Electroencephalographic Technician 078.362-022

For further information, contact:

The American Society of Encephalographic Technologists

## Nuclear Medicine Technologist

**Radio-isotope technologist**

Nuclear medicine technologists (NMT's), working under the supervision of a physician, either participate in or direct various areas of activity involving radioactive drugs used for diagnosis and treatment of human medical problems. Their duties include work with patients; laboratory studies; research; or administrative functions relating to the purchase, use, and disposal of radioactive drugs and safety procedures required in using them.

Technologists in nuclear medicine calculate and prepare the correct dosages of radioactive drugs (radionuclides or radiopharmaceuticals) given to patients by mouth, injection, or other means and then position the patient for radiation imaging procedures. Using gamma ray detecting equipment, nuclear medicine technologists make images of the drugs as they pass through or locate in different parts of a patient's body. They view images on a screen or on films to detect the existence of pathological conditions, which are determined by the amounts of radioactive drugs distributed in various organs, glands, and body systems. This information is used by physicians in diagnosis. Small quantities of radioactive drugs may be administered to a patient and body specimens, such as blood and urine, taken from the patient and measured for radioactive drug content. Radioactive substances may also be added to body specimens to determine hormone and drug content.

Other responsibilities include insuring that radiation-safety procedures are always carefully followed by all workers in the laboratory and that records are kept of all information with which the nuclear medicine laboratory is concerned. This includes patient-medical records; patient-procedures performed; and amounts and kinds of radioactive drugs received, used, and disposed of.

The majority of NMT's work in hospitals, large or small (50 to 100 beds), both private and Federal. Public health institutions, national research institutes, the military, and some private offices are other places of employment.

Nuclear medicine technologists must be able to communicate well with their coworkers and with patients and to work closely with them. They should be able to show understanding and patience when giving instructions and explanations to patients who are often anxious, very ill, or dying. Another important characteristic needed for this career, which involves use of radioactive materials, is the ability to follow instructions, procedures, and regulations precisely. Good health and the ability to do considerable lifting and standing and generally to assist patients not able to help themselves are also necessary qualifications.

At present, there are no formal specializations under the broad title of nuclear medicine technologist. The term nuclear medical technician has also been used, but there is no actual difference in job performance between workers with either title.

## Job Requirements

Education for nuclear medicine technologists can be found in accredited colleges, universities, and approved hospitals. Programs for Nuclear Medicine Technologists are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

An equivalency diploma or graduation from high school—preferably with courses in math, physics, and biology—is a basic educational requirement for future nuclear medicine technologists. There are several ways to become qualified to enter work in this field—the certificate, associate degree (A.A.S.), or baccalaureate degree (B.A. or B.S.). Each way has advantages.

The certificate program consists of 1 year of professional training designed for people who have experience as medical technologists, radiologic technologists, or registered nurses (RN's) or who have baccalaureate degrees. An advantage of this program is that it allows allied health personnel to change professions if they think they would like nuclear medicine. It is a good program if a student already has earned a degree. A disadvantage of the program is that it offers no academic credit and students who do not have a previous academic degree receive no academic credit for a year's work and expense.

Associate (A.A.S.) degrees require 2 years of education while baccalaureate degrees require 4. The advantage of the A.A.S. is the fact that a degree is earned in 2 years. However, it is difficult to include all the required post-high school courses in the year that comes before the year of professional training. Bachelor's degrees (B.A.–Bachelor of Arts with a science major or B.S.–Bachelor of Science) require 4 years. Usually the first 2 or 3 years provide a broad educational base and the last year or two are devoted to professional training. This type of education is useful for advancement. Its disadvantage is the additional time and expense required.

## Opportunities

The employment outlook for nuclear medicine technologists is very favorable. With the growing recognition of the value and need for nuclear medicine procedures, and the trend toward establishment of nuclear medicine departments in hospitals with 50 to 100 beds, there will be an increased need for workers in this area. These professionals can advance in the fields

of education, administration, and research by acquiring more education and by gaining new skills.

DOT Code: Nuclear Medical Technologist 078.361-018

For further information, contact:
American Society for Medical Technology
American Society of Radiologic Technologists
Society of Nuclear Medicine
American Society of Clinical Pathologist
American College of Radiology

## Perfusionist

**Cardiovascular perfusionist**
**Clinical perfusionist**
**Extra corporeal technologist**
**Perfusion technologist**

Perfusionists operate the heart/lung machine needed for complete or partial cardiopulmonary (heart-lung) bypass during the time that surgery is performed to repair defects of the heart or large blood vessels. The machine is also used in cases of respiratory failure.

The physician is consulted in order to select equipment best suited for the needs of both the patient and the surgeon. Cardiopulmonary bypass is so varied that each case must be considered separately in preparing for and conducting the extracorporeal perfusion (maintaining proper oxygen and carbon dioxide levels and circulation outside of the body). To do this, perfusionists must be able to cope with unusual problems when preparing for surgical procedures. Available equipment must be changed to suit the patient's needs, or new equipment, circuitry, and techniques may have to be utilized when equipment on hand is not suited for a special situation.

Specialized experience combined with advanced knowledge of anatomy, pathology, physiology, pharmacology, biochemistry, hematology, cardiology, and surgery are needed to recognize and deal with problems associated with the equipment, surgery, or patient's condition.

Perfusionists use the heart/lung machine to regulate oxygen, carbon dioxide, and blood chemistry and circulation throughout surgery. They must know the limitations of every piece of equipment used and be able to keep it working properly during every moment of surgery. This requires an understanding of what the surgeon is doing, since the need for changes in any part of the procedure must be recognized, often on a split-second basis, and carried out in consultation with the physician.

Other duties which perfusionists may be required to perform include using the heart/lung machine to give anesthetics and other drugs on prescription and to control body temperature of the patient.

Perfusionists are employed by hospitals, surgeons, or professional health corporations. They always work in a hospital setting, regardless of who employs them. They often work more than 40 hours per week, depending on the operating schedule, and they are on call for emergencies, which frequently occur.

Perfusionists should have skillful hands, be able to concentrate for long periods of time, work well under stress, and be able to think and react quickly in emergencies.

### Job Requirements

Training programs in perfusion are offered by hospitals, medical schools, and universities throughout the country. However, the number of training programs available nationwide is extremely limited. Consequently, admission to these programs is highly competitive. Each program specifies its own admission requirements. All require graduation from high school, with a strong background in the sciences, particularly biology and chemistry. In addition, most programs require or give preference to students with 1 or 2 years of college course work that emphasizes science and/or previous experience in an allied health field such as respiratory therapy or medical technology. Because of the competitive admissions process, many students entering the programs hold a college degree. The American Board of Cardiovascular Perfusion currently accredits training programs in this field; however, it is expected that in the near future the American Medical Association's Committee on Allied Health Education and Accreditation, with collaborating organizations, will act as the program accrediting body. Depending on the particular program, in addition to admission prerequisites, training takes 1 to 2 years to complete and includes studies in the areas previously mentioned and intensive clinical experience under supervision.

At present no licensure is required. Certification, administered by the American Board of Cardiovascular Perfusion through a rigorous examination process, is the recognized professional credential in this field. In the near future, to be eligible to sit for the examination, graduation from an accredited program will be required.

In addition, the perfusionist must have clinical experience as specified by the American Board of Car-

diovascular Perfusion.

Perfusionists who successfully complete the oral and written examination are known as certified clinical perfusionists (CCP's). In order to maintain certification, continuing education and clinical experience as specified by the Board is required.

Although certification is not required for initial employment, it is becoming an increasingly important credential for advancement and employment within the field.

### Opportunities

This area of health care is still relatively new. Initial job opportunities for perfusionists are limited. However, experienced perfusionists, especially those who are certified, are in greater demand. Perfusionists may advance to chief perfusionist or to teaching, administration, or research positions by acquiring additional education and experience. Opportunities also exist in industry.

For further information, contact:
American Society for Extra-Corporeal Technology

## Radiation Therapy Technologist

Radiation therapy technologists assist physicians (radiologists) by treating patients with prescribed doses of ionizing radiation supplied and controlled through radiation equipment. They must position patients under the equipment with absolute accuracy, in order to expose diseased body areas to treatment and to protect all other areas from radiation. These technologists, who are aware of the hazards of radiation, are responsible for the safety of patients and other workers and know the need for care and exactness not only in treatment but also in keeping related records. Today, equipment, techniques, and training are much improved and there is no need for concern about health hazards in this career, provided accepted procedures are strictly followed.

When doing this work, the technologists need to assist patients who are not able to help themselves. Therefore, good health and the strength to do considerable lifting and standing are required. Many of the patients, often suffering from cancer, are worried, very ill, or dying and technologists should be considerate, sympathetic, and able to communicate not only with these patients, but with coworkers, patients' families, and physicians.

Radiation therapy technologists usually work in hospitals and clinics and in some physicians' offices. Working hours are regular.

With additional education, available at major cancer centers, radiation therapy technologists can specialize and become medical radiation dosimetrists. In this specialty, they work with health physicists in determining the best radiation dosages for various problems as well as the special devices needed to expose only a small section of a body part to radiation.

### Job Requirements

Graduation from high school, with courses in biology, math, and physics, is necessary. Professional education for radiation therapy technologists is a minimum of 24 months and includes classroom, laboratory, and clinical education. Applicants may complete the 24-month program in radiography and enter an additional 12-month program for radiation therapy technology. An alternative is a 24-month program for high school graduates in radiation therapy technology. Professional education can be obtained at major cancer centers affiliated with approved programs of radiation therapy technology, or colleges and universities which are affiliated with major cancer centers. Programs for radiation therapy technologists are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

Depending on the facility chosen and on the length of the program, the student is eligible for a certificate or an associate or bachelor's degree.

Certificates given for hospital-based education show successful completion of a course in radiation therapy technology. This educational route may be less costly compared to academic education which leads to associate or bachelor's degrees. However, some colleges will not give academic credit for this certificate should the individual wish to earn a higher degree later. Associate degrees require a minimum of 2 years of professional education at approved colleges. Bachelor's degrees require 4 years at approved colleges or universities. Both of these programs are more expensive than a certificate or hospital-based education, but they provide academic degrees, which are useful for those students who want to advance in this career.

The American Registry of Radiologic Technologists offers a national examination, and some States also require certification. Continuing education is also voluntary but is strongly recommended for advancement. A continuing education program known as

ECE (Evidence of Continuing Education) is available through the American Society of Radiologic Technologists.

## Opportunities

Currently there is a severe shortage of qualified radiation therapy technologists throughout the country. It is expected that this shortage will continue for at least the next 5 years. Research into new methods of cancer treatment will probably produce even greater need for these workers.

Additional education at the college or university level will provide opportunity for advancement to teaching or positions of management in this profession.

For further information, contact:
American Society of Radiologic Technologists

# Radiologic Technologist

**Radiographer**
**Radiographic technologist**
**X-ray technologists**

Radiologic technologists, following the instruction of a physician, take X-ray films (radiographs) of all parts of the human body for use in diagnosis of human medical problems. They assist physicians in performing specialized procedures and are responsible for the care and safety of patients who are being radiographed.

Radiologic technologists work in hospitals, clinics, physicians' offices, private medical laboratories, public health laboratories, dental offices, and clinics, and also in private industry. The number of hours worked depends on the type of employment. Hospitals may require these technologists to be on call at any hour when emergencies occur. Weekend and night duty may have to be shared with other professionals.

Radiologic technologists may also be hired on a part-time basis to substitute for vacationing staff members or to help out during the heaviest hours of the day. Duty in doctors'offices depends on office hours.

Good health and the ability to stand and lift patients who can't help themselves is important. It is also necessary for radiologic technologists to give clear, exact instructions to patients and to communicate and work well with coworkers and physicians. At all times, they must follow precisely not only physicians' instructions but also regulations concerning use of radiation to insure that they, patients, and coworkers are protected from its dangers.

Radiographic technologists may specialize in X-ray procedures which are only used for certain parts of the body or which require use of different techniques or use of equipment providing a different type of image or picture than the standard X-ray. Specializations are the following:

Computerized tomographers use special equipment linked to a computer for cross-section X-rays of various parts of the body.

Mammographers use a variety of X-ray techniques for breast examination.

Thermographers use nonradioactive equipment which produces an image or picture by means of tiny differences in amounts of heat given off by noncancerous and cancerous tissues in the body. Cancerous tissue gives off higher temperatures than normal.

Xeroradiographers use X-ray equipment with special radiographic plates rather than X-ray film. This technique gives better pictures of some kinds of body tissue than does regular film.

Diagnostic medical sonographers use equipment which produces an image from sound waves reflected back from parts inside the human body. (See description of diagnostic medical sonographer.)

## Job Requirements

A high school degree with courses in math, physics, and science is required for entry into a program for radiologic technologists. Professional education takes 2 years and includes classroom, laboratory, and clinical experience that provides the student with basic education, training in the use of complex equipment, and experience in performing patient examinations.

Certificate programs in hospitals are the least expensive method of education. However, the certificate program does not give academic credit, and if the person wants a higher degree later on, colleges and universities may not accept the certificate for college credit.

Associate and baccalaureate degrees are given by colleges and universities with approved clinical affiliation. They are usually more expensive but they do provide academic credit and are desirable for those who want career advancement in this profession. Programs for radiologic technologists are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

Education for the specializations mentioned before can be obtained as follows:

Computerized tomographers learn necessary techniques through clinical education.

Mammographers may get specialized education at various breast-cancer detection centers.

Thermographers are educated at specialized centers.

Xeroradiographers are taught the differences between regular X-ray and radiographic plates by the Xerox company.

## Opportunities

At present, some areas of the country have too many radiologic technologists, while others don't have enough. Advances in equipment and techniques may improve the outlook for this job in the future. However, this improvement will depend on general economic trends for hospitals and other clinical facilities.

Additional education leading to associate and bachelor's degrees will provide opportunities to learn new skills and get background knowledge useful for advancement to management and teaching positions.

Certification for radiologic technologists is voluntary. Individuals who have completed an approved educational program in this profession in a hospital, college, or university are eligible to take the national examination offered by the American Registry of Radiologic Technologists. At present, New York, New Jersey, and California have State certification programs and a number of the other States are also establishing requirements. Individual States should be checked for requirements. There is also a voluntary program for continuing education available through the American Society of Radiologic Technologists.

DOT Code: Radiologic Technologist 078.362-026

For further information, contact:
American Society of Radiologic Technologists
American College of Radiology

# Respiratory Therapist

**Inhalation therapist**
**Pulmonary therapist**

Respiratory therapy is important in emergency situations, as well as in diagnosis, control, and preventive care of patients with cardiopulmonary (heart-lung) problems.

Respiratory therapists, working under a physician's supervision, perform procedures necessary in maintaining life in seriously ill patients with breathing difficulties. They also assist in treating other problems which affect both heart and lungs, such as heart failure, asthma, emphysema, blood clots in the brain, severe bleeding, and shock. Medical gases and devices to control temperature, air pressure, and humidity are used for giving treatments. These workers help or teach patients to do exercises that aid in clearing the lungs of fluids and improve the patient's ability to breathe. They assist in reviving patients who are no longer breathing and whose hearts have stopped (cardiopulmonary resuscitation), and they help to clear material which may be blocking patients' air passages. Other duties include monitoring patients' breathing or testing with equipment which measures amount and pressures of air breathed in and out and amounts of gases in the blood. The testing is useful in diagnosis as well as research.

Respiratory therapists are almost always employed by hospitals in intensive-care units, nurseries for the newborn, surgical and medical areas, and emergency rooms. They work closely with patients and other members of the health-care team, and it is essential that they be alert to changes in patients' conditions, communicate and work well with others, and respond quickly in emergencies. Manual dexterity and the ability to stand or walk during most of their working hours are important.

Respiratory therapy services are generally provided on a 24-hour basis, so therapists may expect to rotate through all shifts.

There are some special areas of work in which respiratory therapists may be interested. At present, training for these areas is strictly on the job.

Adult critical care involves care of adults who have to remain in respirators for long periods of time.

General pediatric care applies to babies and children who need the aid of a respirator to breathe. This area requires learning the techniques which apply to children.

Pediatric/neonatal critical care is concerned with care of newborn or older children who have suddenly stopped breathing for various reasons. Training for this area is quite different from the other specialities.

## Job Requirements

Therapist training is available in over 150 programs across the country. Most of these are at the associate degree level and usually require 2 years of study, including over 1,000 hours of clinical instruction. A number of baccalaureate degree programs exist in universities. However, most programs are in community colleges. Programs for respiratory therapists are accredited by the American Medical Association's Committee on Allied Health Education and Accreditation.

Only a few States require a license for employment in respiratory therapy. However, voluntary national certification is available through the National Board for Respiratory Therapy. Examinations are required for those who qualify.

Continuing education for respiratory therapy is not required. However, it is widely available across the country and is offered through hospitals, schools, and by membership associations.

## Opportunities

Prospects for employment in this field should be good since chronic lung disease is on the increase and trained therapists will be needed to treat these patients. It is also expected that opportunities will come along in home care and in rehabilitation.

Generally speaking, advancement in clinical practice goes from care of "general" to "critical" patients. Extra skills are needed to judge the condition of patients with breathing as well as other organ system (heart, kidney) failures. Ability to combine breathing care with many other nursing and medical functions is also required.

Therapists may also advance into supervision and management positions, and with additional academic training or job experience may become hospital administrators.

The therapist in education can also go into supervision and management. Jobs for hospital "in-service" trainers, teaching respiratory (breathing) therapy and other personnel are widely available, especially for therapists with skills or training in teaching. Many therapists have found careers as instructors in respiratory-therapy education programs, and with additional academic training in education they are eligible to advance up the line to professor.

DOT Code: Respiratory Therapist 079.361-010

For further information, contact:
American Association for Respiratory Therapy.

# Respiratory Therapy Technician

### Inhalation Technician
### Pulmonary Technician

Respiratory therapy technicians work under the supervision of both the therapist and the physician. Their duties are essentially the same as that of the therapist. However, they make fewer decisions and have less responsibility in performing treatments because their knowledge of anatomy, physiology, pharmacology, and clinical medicine is not as extensive. One year, including 800 hours of clinical training, is required to train the technician in the more than 150 training programs available to them. These programs are usually given in hospitals and community colleges.

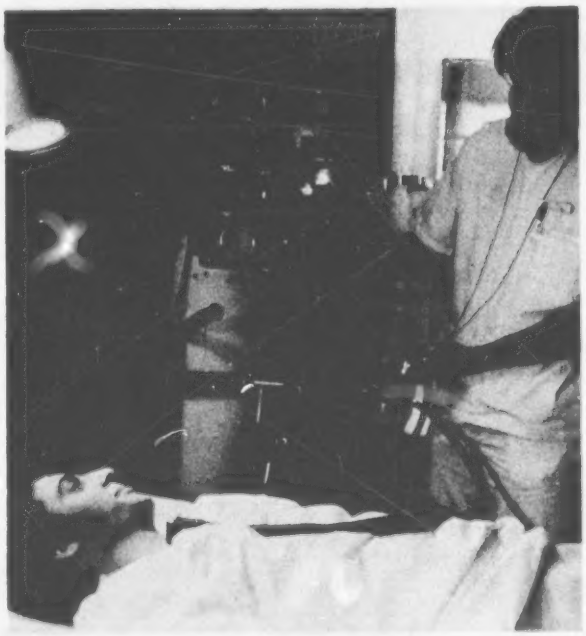
Programs for respiratory therapy technicians are accredited by the AMA's Committee on Allied Health Education and Accreditation.

Voluntary certification is also available to the technician through the National Board for Respiratory Therapy. An examination is required for those who qualify.

With additional education and training, employment outlook and chances for advancement are the same as for the therapist.

DOT Code: Respiratory Therapist 079.361-010

For further information, contact:
American Association for Respiratory Therapy



# Therapists

The primary objective of therapy is helping individuals with physical, mental, or social handicaps to regain their capacity for self-help and independence. To meet this goal, different kinds of therapists are employed, each with special knowledge and skills which can be used in rehabilitation. For example, art, dance, and music therapists bring both artistic and therapeutic skills to their work and try to improve the mental and physical well-being of their patients. Dance and art techniques are used as nonverbal means of communication, and, along with music, are often useful in helping patients to resolve physical, emotional, and social problems. Horticultural therapists use gardening, an enjoyable and relaxing activity, for such purposes as training disabled or handicapped patients, evaluating the abilities of patients, or as a social activity for patients. Corrective therapists treat their patients by using medically prescribed exercises and activities. Physical therapists work with persons who are physically disabled by illness, accident, or birth defects. They use exercise and such treatments as heat, cold, and electricity to improve the patient's condition.

Occupational therapists help individuals with physical or emotional disabilities by teaching daily living skills or job skills. On the other hand, manual arts therapists use industrial arts such as graphics or wood and metalworking to rehabilitate their patients. Recreation therapists use sports, games, crafts, camping, and hobbies as part of the rehabilitation of ill, disabled, or handicapped persons. Athletic trainers care for and try to prevent injuries of individuals engaged in professional, amateur, and school athletics.

Persons whose limbs are lost or disabled through injury, disease, or birth defects require highly skilled and specialized services, provided by orthotists and prosthetists. Orthotists make and fit orthopedic braces, while prosthetists make and fit artificial limbs.

Speech pathologists and audiologists work with children and adults who have speech, language, or hearing impairments. Rehabilitation counselors help persons with physical, mental, or social problems return to or begin a normal life by obtaining satisfactory work.

It is obvious that therapy and related activities offer a broad area for career exploration by interested individuals, and in the following pages each of the specializations mentioned briefly here is treated in greater detail.

## Art Therapist

**Activity therapist**
**Art psychotherapist**
**Art specialist**

Expressing personal ideas through art and achieving some sense of well-being as a result is a very old concept. Pictures have been found scratched or painted on the cave walls of primitive man, and many ancient tools and objects were designed not only to be useful but also artistically pleasing. Exactly what made the cave dwellers and their ancestors draw the pictures or design the objects is not known, but it can be assumed that they must have received some sort of emotional satisfaction from creating them. This is the basis of art therapy which, simply stated, uses the concept of art as a device for non-verbal expression and communication. Art therapy attempts to resolve the individual's emotional conflicts and encourages personal growth and self-understanding.

The most practical application of art therapy has been with those suffering from mental disorders, mental retardation, or other problems of social and psychological development, but innovative work has also been done on a variety of other problems. Art therapists confer with members of the medical health team to diagnose patients' problems. Combining art, education, and insight, art therapists assess their patients' problems, strengths, and weaknesses and determine a course of treatment best suited to accomplish specific treatment goals. Art therapists plan art activities, maintain and distribute supplies and materials, provide art instruction, and observe and record the various relationships that occur during therapy sessions. Emphasis is not placed on the quality of the product, but rather on the well-being of the patient. Art therapists often work as members of teams of other professionals and coordinate their activities with those of other therapists.

Art therapists work with people of all ages who have varying degrees of impairment or with normal populations in schools and growth centers. They may practice with individuals, groups, and/or families in clinical, educational, or rehabilitative settings which include private psychiatric hospitals and clinics, community health centers, geriatric centers, drug and alcohol clinics, nursing homes, halfway houses, prisons, public and private schools, and institutions for the emotionally disturbed, learning disabled, brain damaged, deaf, blind, physically handicapped, and multiply disabled. Many art therapists who work in

clinics also teach art therapy in colleges or universities, and may do research in some aspect of therapy. However, the primary involvement of most art therapists is with clients in some type of clinical setting. Art therapists normally work a 40-hour week, although the hours and degree of responsibility vary with the setting. The facilities they work in are usually fully equipped with art materials, tables, chairs, art desks, and storage areas, and in general the working conditions are good.

## Job Requirements

Entry into the field of art therapy at the professional level requires a master's degree or its equivalent in institutional training. Undergraduate work in the fine arts and the behavioral and social sciences is not only desirable but, in most instances, required for entry into the master's program. An undergraduate program specifically planned to lead to a degree in art therapy would be even more helpful. Training is offered at a number of schools, clinical facilities, and other institutions located throughout the United States.

Licensure is not required for art therapists unless they work in public schools. In such cases, they must be licensed in the State in which they plan to work. The American Art Therapy Association, Inc. has established a national registry for art therapists, and to be accepted for registration with the association the applicant must meet certain experience and educational requirements. A master's degree in art therapy and 1 year of work experience will satisfy the requirements, but there are also several other ways in which the requirements may be met. Specific information on other methods of meeting registration standards can be obtained from the association. Registration is not always required for employment, but each year more employers are asking for this credential.

## Opportunities

The employment outlook for qualified art therapists is favorable, and opportunities in this field are expected to grow.

There are no uniform paths of advancement for art therapists. Promotion may take many forms including assuming additional responsibility, administering an art therapy project, or moving into a specialty field such as special education, psychotherapy, or drug counseling. In most instances, promotions are based on experience and/or additional training.

DOT Code: Art Therapist 076.127-101

For further information, contact:
American Art Therapy Association

# Athletic Trainer

**Certified athletic trainer**

Athletic trainers are professionally trained medical technicians who work in conjunction with and under the supervision of a physician. They are responsible for the prevention and care of injuries usually associated with competitive athletics. They administer immediate first aid to injured athletes and carry out treatment and rehabilitation procedures prescribed by the team physician. They also keep the team coach informed of the injured athletes' condition.

Trainers' duties include taking care of minor injuries such as cuts, scratches, abrasions, and blisters; making protective devices such as mouthpieces and injury pads; and taping, wrapping, and padding injuries. Trainers must be skilled in massage and corrective-exercise techniques and be able to use therapeutic equipment such as diathermy units, whirlpools, infrared lamps, and ultrasound machines. Athletic trainers also conduct conditioning and rehabilitation programs; plan menus and supervise diets; and aid in purchasing and fitting equipment. Some athletic trainers also make travel and menu arrangements for traveling teams. Since many athletic trainers are employed by educational institutions, including secondary and higher education facilities, they often teach classes in related or nonrelated subjects as part of their regular duties.

Most athletic trainers work in secondary schools, colleges, or universities, and a limited number are employed by professional athletic teams. The nature of the work requires athletic trainers to work long and irregular hours. It is not uncommon for trainers to work 55 or more hours per week. Emergencies and illnesses which require their attention may come up at any time, and the regular schedule includes any of the days and evenings of the week, often including holidays. Travel can be part of the job and is a necessity for trainers who work with a professional team, which may be away from home for long periods of time.

## Job Requirements

The educational minimum for entry into this work is a bachelor's degree in athletic training, but an increasing number of candidates have graduate training. The certifying agency for programs in athletic training is the National Athletic Trainers Association (NATA). Typical courses of study include anatomy, physiology, physiology of exercise, kinesiology, physics, chemistry, psychology, first aid, safety, nutrition, administration of health and physical education programs, and techniques of athletic training. In addition, the program may lead to teaching certification in physical or health education.

Certification by the National Athletic Trainers Association (NATA) is not required to obtain employment, but it is considered to be a valuable credential in this field. To become a certified athletic trainer, an individual must meet a number of requirements, including having a college degree with specified courses and a teaching license. The certification candidate must also have worked for 2 years under a National Athletic Trainers Association (NATA) supervisor, have been a member of NATA for 1 year, and pass the NATA certification examination. There are colleges in 26 States which offer approved NATA curriculums.

## Opportunities

At present, most opportunities exist in learning institutions. However, future demand in these positions may be determined to a large extent by federal legislation which, if introduced and passed, will require each school to employ an athletic trainer. Currently, the trainer with the best employment potential for these jobs is also able to teach a subject or subjects for which there is a demand. The more subjects the trainer is able to teach, the greater the chances for employment. Some athletic trainer positions require individual trainers to serve a group of schools or an entire school district. Under this arrangement, the trainer is usually located in a central place, such as a stadium, and has a small staff which provides the schools with an athletic trainer and facilities. In some cases, trainers take teaching positions in which they teach the skills of the profession to other athletic trainers. Competition is keenest for positions with professional athletic teams, and chances of starting a career as a professional trainer are very slim.

Advancement in this career is regulated by the employing institution or team, and, although there are no set patterns of advancement, a number of possibilities exist. One would be to start as an assistant athletic trainer, progress to trainer, and then to head trainer or director of training. A trainer at an educational institution might work into an athletic administration position. The athletic trainer whose employment is with a professional team is in a somewhat special employment situation. Usually, the professional trainer works only with one sport. Although most professional

teams operate only approximately 6 months a year, they have an off-season program and employ the trainer during the full year.

DOT Code: Athletic Trainer 153.224-010

For further information, contact:
National Athletic Trainers Association

## Corrective Therapist

**Adapted physical educator**
**Therapeutic exercise specialist**

Corrective therapists treat patients by using medically prescribed physical exercises and activities which strengthen and coordinate body functions and prevent muscular deterioration caused by inactivity due to illness. They apply the principles, tools, techniques, and psychology of medically oriented physical education to help persons with physical and mental problems meet their treatment goals. Therapists design or adjust equipment and devise exercises to meet the needs of patients. They instruct patients in proper exercise techniques and equipment usage to meet specific objectives such as walking, joint flexibility, endurance, strength, or emotional self-confidence and security. For the physically handicapped, the exercise routines are aimed at developing strength, dexterity, and coordination of muscles. Therapists teach exercise routines to wheelchair patients, instruct amputees or partially paralyzed patients how to walk and move around, and sometimes give driving lessons to handicapped persons using specially equipped automobiles. They also advise patients on the use of braces, artificial limbs, and other devices. For the emotionally ill or mentally retarded, they use exercises to relieve frustration or tension, or to bring about social involvement.

Corrective therapists also judge strength, endurance, and self-care ability to gage the patient's recovery at successive stages. Corrective therapists participate in staff planning sessions and make ward rounds as members of health-care teams. They prepare progress reports on patient responses to therapeutic treatment exercises and present findings orally or in writing at staff meetings and conferences. Corrective therapists also counsel members of the patients' families on therapeutic matters. Corrective therapy should not be confused with physical therapy. Physical therapists employ physical agents such as heat, water, and light in treatment routines, and perform tests to determine nerve, muscle, and skin condition and reaction. Corrective therapy is used mainly in the more advanced stages of rehabilitation where functional training is required.

Some corrective therapists choose areas of specialization in this field. Corrective therapists who specialize in driver training are concerned with teaching handicapped persons safe driving methods, developing their remaining skills, and teaching them to use special driving devices. Seminars and workshops in driver training are required for this specialization and therapists working in this area are primarily employed by the Veterans Administration. Corrective therapists who specialize in cardiac rehabilitation are concerned with conducting programs of cardiorespiratory rehabilitation which entail checking patients pulmonary levels, establishing work performance limits, and establishing levels of progression to attain optimal fitness capabilities. Workers receive specialized training in cardiopulmonary theory, methodology and techniques, and the use of specialized equipment. Some corrective therapists are beginning to specialize in therapeutic exercise activities which are conducted in therapeutic pools in numerous hospital and health-education sites. This specialization requires water safety certifications, such as those given by the Red Cross or YMCA/YWCA, and knowledge of effects of water activities and effects of water on exercise performance.

Corrective therapists work in a variety of government, public, and private facilities, including hospitals, rehabilitation clinics, schools, colleges, and universities, nursing homes, special schools, recreation facilities, and camps for the handicapped. They work a 40-hour week, usually in an indoor setting although outdoor recreation areas and pools are also used. There are a variety of physical demands involved in being a corrective therapist, such as demonstrating exercises and equipment use, lifting and balancing patients, and handling and adjusting therapeutic-exercise equipment.

### Job Requirements

A high school student considering a career in corrective therapy can plan on spending at least 4 years in obtaining a bachelor's degree in physical education from an accredited college or university. In addition to completing degree requirements, prospective corrective therapists must also complete a 400-hour clinical internship at an approved institution. Courses taken as part of the degree requirements, or in addition to them,

include medical orientation courses in neurology, pathology, therapeutic exercise, developmental psychology, psychology of the exceptional/atypical, kinesiology, advanced anatomy, neuromuscular re-education, and physiological psychology. Many of these courses are required for a master's degree, and while this level of education is not required for entry into the field, it is considered an asset in seeking both entry level and promotional positions.

There are no State licensure requirements for corrective therapists at this time. However, therapists are eligible for certification if they meet the requirements set by the American Corrective Therapy Association. Requirements for certification include a bachelor's degree in physical education, specific medical/thereapeutic orientation courses, 400 hours of clinical training experience, and a satisfactory score on the certification examination. While certification is not normally considered a condition of employment, it is considered advantageous since it indicates that the therapist has met the standards set by the association. The association also encourages its membership to enroll in continuing education courses as a means of improving professional growth and development.

## Opportunities

The employment opportunities for corrective therapists are favorable. There is also the prospect of future growth and expansion in the profession as the importance of corrective therapists in rehabilitation is recognized to a greater degree and increases in government funding of programs occur.

Advancement to supervisory or administrative positions is possible for qualified therapists. Promotions are generally based on work experience, level of skill, and the completion of advanced education courses. Therapists in government facilities can advance through the traditional civil service methods.

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DOT Code: Corrective Therapist 076.361-010

For further information, contact:
American Corrective Therapy Association

# Dance Therapist

**Dance/movement therapist**
**Movement therapist**
**Psychomotor therapist**

For centuries dancing and related types of body movement have been recognized and used not only as a form of entertainment but also as a way to ease tension and obtain other physical and emotional benefits. To many, this type of physical activity produces a renewal of emotional well-being, a means of self-expression, and a recharging of energy that has been drained away by the frustrations of everyday living. In this sense dancing and body movement are therapeutic activities. A practical application for use with individuals who have emotional and often physical impairments caused by injury, illness, or birth defects has been developed by dance therapists who use dance and body movement as a tool to further emotional and physical integration and well-being. They take advantage of the expressive and communicative aspects of dance to help people resolve social, emotional, and physical disorders.

Dance therapists make an assessment of their client's emotional and social behavior, movement capabilities, and general posture. They then determine what types of movement experiences will best help the client to develop an increased awareness of feelings and nonverbal behavior, a wider, closer interaction of mind and body, an improved body image, improved social relations, and relief from physical and emotional blocks. Working with individuals and groups, dance therapists plan and conduct movement sessions designed to achieve those goals and objectives that they have worked out with their clients. In many instances, dance therapists also work in cooperation with other mental health professionals. They discuss client goals and progress to coordinate treatment activities and work toward overall objectives. Dance therapists also participate in case conferences, staff meetings, community meetings, verbal therapy sessions, and other activities, depending on the setting in which they work. Some engage in research on movement behavior, teach or train others in educational or employment settings, or act as consultants to various agencies or organizations. While there are many varieties of dance therapy settings, only one real area of specialization exists: movement research. The movement researcher observes, records, and analyzes nonverbal behavior in live settings, on videotape, or on film. In addition to the general knowledge and experience required of the dance therapist, the movement researcher must have completed advanced courses in movement observation and research methods.

Dance therapists work in a variety of mental-health settings, including psychiatric hospitals, clinics, day-care centers, community mental-health centers, developmental centers, correctional facilities, special schools, substance-abuse programs, and facilities for the aged. Registered dance therapists may also work in private practice or teach in educational facilities. Hours and other working conditions vary, as do the facilities themselves. Some are modern and well equipped, while others are older and sometimes quite sparse in terms of equipment and other things that contribute to pleasant work/therapy setting. Most aspects of the work involve close physical contact with different types of patient groups, as well as a good deal of physical activity. In all instances, strength, flexibility, stamina, and a strong desire to relate to and help others are necessary.

## Job Requirements

There are two basic ways in which an individual may prepare for a career as a dance therapist. The first is the master's degree from a program in dance therapy, which will be required for registry by the American Dance Therapy Association (ADTA) in 1983 and is currently recommended by that association as the professional level of training. The alternate way is a master's degree in a related field (e.g., psychology) with intensive training in the theory and practice of dance therapy and internship experience.

Neither method of preparation requires specific high school courses, but dance training in a broad range of techniques is strongly preferred. The minimum preprofessional training includes a B.S. or B.A. drgree with extensive training in a variety of dance forms, course work in psychology and other social sciences, anatomy, and kinesiology. The preferred pre-professional training includes a bachelor's degree in liberal arts with emphasis in dance or psychology, courses in dance theory, performing and choreographic experience, experience in teaching dance to normal populations, and experience in personal psychotherapy. Either program may require a movement interview for acceptance.

The master's program in dance therapy, which is from 1½ to 2 years in length, includes training in both theoretical and practical aspects of dance therapy. Studies emphasize using body movement to establish communication and rapport with clients and learning to

observe and analyze movement behavior. Courses include practical training and dance therapy, movement observation, psychodynamics, and studies in human behavior. Supervised experience in clinical settings, field visits, and internships are also included.

The possible alternate requires a master's degree in a related field (dance, psychology, social work, etc.), at least 120 hours each of theory and practice of dance therapy, and course work in group dynamics, anatomy and kinesiology, and techniques of observing and assessing movement behavior. A 700 hour clinical internship, supervised by a registered dance therapist, is also required. The disadvantage of this type of program is that it may lack the coherence and integration of a master's degree program in dance therapy. It is useful for those who already have a master's degree in a related field and can complete the other required course work before September 1983.

There are no licensing requirements for this work, and most employers do not require registration or certification. However, the American Dance Therapy Association (ADTA) has established a registry to insure professional standards of training and practice. Registration with this association is needed to work in private practice and to train dance therapy students. It may also be preferred by many employers, especially if there is a dance therapy internship program in existence at the facility or projected for the future, but there are no laws which require registration for employment. To qualify for registry with the ADTA at present, there are several requirements which must be met. Generally, they include membership in the ADTA; a bachelor's degree (a master's degree in 1980) with prescribed education, training, and experience requirements; 2 years of paid experience with work in several specific areas of dance therapy; and a written description of a therapy session showing an integration of dance therapy theory and practice.

### Opportunities

At present, dance therapy jobs are in short supply, but several factors may influence this situation, including a growing interest in nonverbal communication; awareness of the importance of body image in mental health and education; and the maintenance of high training standards. If each of these factors remain constant or accelerate and money is available, demand for dance therapists in all areas should open up. However, interested individuals should check available openings in their areas and contact the professional association to get a detailed report of local labor market conditions.

In most cases, advancement possibilities in this field are determined by the requirements of the employing facility and standards and practices vary greatly. However, a master's degree and paid work experience are factors given heavy consideration for promotion to senior clinical positions in most facilities. Teaching or administrative skills are also quite useful for purposes of advancement.

For further information, contact:
American Dance Therapy Association

## Horticultural Therapist

**Garden therapist**
**Hort-therapist**

Horticultural therapists use horticultural activities as the primary treatment method to bring about a beneficial change in an individual with a physical, mental, or social handicap. They use gardening for a variety of purposes, such as to rehabilitate patients after illness or injury; train impaired, disabled, and handicapped persons; evaluate patients' disabilities and capabilities; and provide a social activity for physically and mentally impaired persons.

Horticultural therapists organize indoor or outdoor programs for patients with different types of problems and usually do so in a group setting. They use plant materials to help handicapped individuals improve their emotional attitudes through a change in self-concept, their social skills through nonthreatening relations with others, their physical skills through activities requiring both gross and fine motor coordination, and their mental skills. Horticultural therapists work closely with other staff members to design and conduct the program suited to the needs of the particular client. In some programs, particularly those related to vocational rehabilitation, the plants may be sold, and in this situation the therapist may also have some business responsibilities. In addition to working directly with patients, horticultural therapists often teach at local colleges or universities and conduct workshops and other training programs.

Most horticultural therapists work in public or private facilities for the handicapped, including convalescent homes, juvenile centers, schools and training centers for the mentally retarded, psychiatric hospitals,

and general-care hospitals. Horticultural therapists work closely with both people and plants, and the work setting is often a greenhouse or outside garden. Care of plants can be demanding, and the ability to move the hands easily and skillfully is very important. However, there are no physical requirements for the job, and handicapped individuals may, in fact, have the advantage of serving as role-models for patients.

### Job Requirements

Degrees in horticultural therapy are offered by colleges of agriculture and departments of horticulture and forestry in a number of universities. There are four levels of degrees in horticultural therapy; associate of arts, bachelor of science, master of science, and a doctorate. The length of training varies with the student's academic goal, which may be an associate degree leading to a position as a horticultural therapy aide or a bachelor of science degree which leads to a position as horticultural therapist. The training program consists of a horticulture curriculum with courses related to therapy as a specialization, plus internship and field studies.

At this time horticultural therapists are registered under a voluntary registration procedure administered by the National Council for Therapy and Rehabilitation through Horticulture. Neither registration nor continuing education is required at this time; however, all practitioners are strongly encouraged to participate.

### Opportunities

Since this is a very new professional field, it is difficult to make accurate projections as to future occupational opportunities. However, the experience of the National Council for Therapy and Rehabilitation through Horticulture and a study conducted under the auspices of the Office of Education (HEW) indicate that the potential for jobs in this field is excellent and will continue to increase in the future.

Most horticultural therapy programs today are new and small, but they show signs of rapid growth. As programs increase in size, the opportunities for supervisory and other higher level positions are expected to expand. In addition, therapists who complete advanced training and education can obtain teaching positions in their field.

For further information, contact:
National Council for Therapy and Rehabilitation through Horticulture

## Manual Arts Therapist

**Compensated-work therapist**
**Incentive therapist**
**Industrial therapist**
**Recreation specialist (military)**
**Sheltered workshop supervisor**
**Vocational therapist**
**Work evaluator**

Manual arts therapists use mechanical, technical, and industrial activities which are vocationally significant to assist patients in their recovery and in maintaining, improving, or developing work skills. Under the direction of a physician, manual arts therapists develop a program of actual or simulated work situations which help patients to prepare for an early return to their communities as well as to the world of work.

In rehabilitation, manual arts therapists apply clinical techniques for treating the physical or mental conditions of their patients, observe their behavior, assist in their adjustment to work situations, and evaluate their manual abilities and work skills. The primary purpose is to engage patients in therapeutic activities which absorb them and help in their recovery, giving them a sense of confidence and achievement. At the same time, these work activities have a practical value since they serve to retrain patients in their own skills or trades or, where disability makes this impossible, to help them explore and learn new work skills or avocational activities.

Manual arts therapists cooperate with all members of the rehabilitation team to plan and organize work activities, considering the patient's disabilities and capabilities. Manual arts therapy may be the only therapy prescribed for a patient, or it may be used together with other therapies in a combined treatment program. It may be prescribed at any stage in the hospitalization, depending on the patient's condition and rehabilitation goals.

Patients may explore various work activities offered in manual arts therapy, including woodworking, metal working, electronics, printing and graphic arts, and sometimes agriculture. For example, a construction worker who has lost a leg in a fall may discover an interest in drawing and be taught technical drafting. A bedridden patient may learn basic electricity by using batteries and simple hookups and later advance to electronics. A patient in a wheelchair may explore jewelry or watch repair. A group of mental patients may help maintain hospital grounds. It is the job of the manual arts therapist to observe, evaluate, and guide the pa-

tients in their work activities toward their rehabilitation goals.

Manual arts therapists prepare reports describing patients' emotional and social adjustment and physical performance and work tolerance. These reports are used by the rehabilitation team in judging the progress of patients and their ability to meet the physical and mental demands of their place in the community and in the world of work.

The majority of manual arts therapists are employed in hospitals and centers operated by the Veterans Administration, but they also work in sheltered workshops, mental health clinics, workmen's compensation rehabilitation centers and rehabilitation centers for the blind. The federal law requiring schooling for all handicapped children has opened a new field. Therapists normally work indoors from 8:00 AM to 4:30 PM 5 days a week, do little traveling, and generally have good working conditions. Because of the workshop setting, some noise, dust and fumes are normally present, but these factors are usually controlled.

## Job Requirements

The minimum qualification for employment in this field is a bachelor's degree in industrial arts or manual arts therapy. In addition, candidates must complete clinical training lasting several months during which the student trainees work with fully qualified therapists and participate under supervision in a treatment program. Clinical training is usually given in hospitals or rehabilitation centers affiliated with colleges.

The American Association for Rehabilitation Therapy is the professional society for manual arts therapists and sponsors the Registry of Medical Rehabilitation Therapists and Specialists. The registry requires that a therapist be employed for 1 year in the field before being eligible for registration. Registry and membership in the association is not a condition for employment but both are considered desirable, because of opportunities for continuing education by attending seminars, meetings and conferences, and preprofessional growth by exchange of information with other professionals.

## Opportunities

The employment outlook for manual arts therapists is average, and with the current growth in rehabilitation, the demand for manual arts therapists is expected to increase slightly. The largest single employer is the Veterans Administration, with entry through the federal civil service system. Manual arts therapists may also be employed by State, local, and private facilities. Promotional opportunities in civil service are determined by specific rules; in private facilities they vary widely. Experience and competence are significant factors for promotion.

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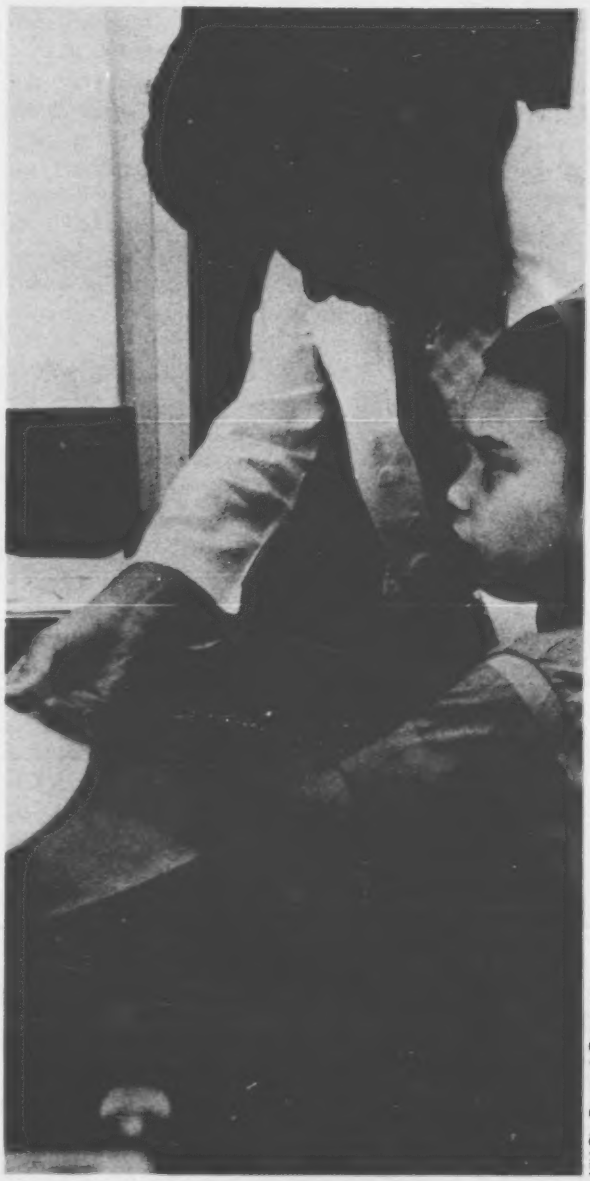
DOT Code: Manual-Arts Therapist 076.124-010

For further information, contact:
American Association for Rehabilitation Therapy



NIH Div. Research Resources

## Music Therapist

**Adjunctive therapist**
**Creative arts therapist**
**Music specialist**
**Rehabilitation therapist**
**Therapeutic activities worker**

Music has been a part of almost every culture and is recognized everywhere as having healing value. A great deal has been written about its effects and it is often described as soothing, relaxing, exciting, moving, or in terms of some other emotional feeling it creates in the listener or performer. For each individual it serves a different purpose, and for some, many purposes. For those who are disabled, music may become an actual part of medical treatment.

Music therapists have an understanding of both music and psychology and are specialists in using music as a means of accomplishing treatment goals which involve the restoration, maintenance, and improvement of mental and physical health.

In its use with the mentally ill, music therapy may achieve changes in patients' behavior that will give them new understanding of themselves and of the world around them. This can serve as a basis for improved mental health and more effective adjustment to normal living.

Often working as members of a team that may include other therapists, psychiatrists, psychologists, social workers, and special educators, music therapists make an evaluation of how a client may be helped through a music program. They determine what goals and objectives can probably be met and plan musical activities and experiences which are likely to meet them, both on an individual and group basis. Therapists treat patients of all age groups, ranging from disturbed small children and adolescents to adults who suffer from mental illness of many types and varying degrees of seriousness. As members of the mental health team, music therapists devise programs to achieve aims prescribed by attending psychiatrists, and the treatment results are evaluated periodically.

The mentally retarded, cerebral palsied, crippled, and blind make up a group that is second only to the mentally ill in numbers receiving music therapy.

Music therapists may devise programs of many kinds in an effort to gain and to hold the patient's interest. Much depends upon the patient's potential for training, for what would be possible for one would be inappropriate for another. Group singing is commonly used. Musical appreciation and musical education is appealing to others. Every effort is made to improve skills acquired in past years and to develop an interest which will, in itself, give a new dimension to normal living.

It should be noted, however, that unlike most music programs, music therapy programs focus on the well-being of the client rather than a perfected musical product. Voice as well as traditional and nontraditional instruments and music are utilized and individual lessons are provided. In addition, instrumental and/or vocal music is often combined with body movements as a part of therapy.

Music therapists may find employment in a variety of facilities in all parts of the country. They are usually employed in psychiatric hospitals, mental retardation centers, physical disability treatment and training institutions, day-care centers, nursing homes, special education programs, community mental-health centers, special services agencies, and other related facilities.

As in many therapy situations, music therapists work very closely with their clients and must be able to relate to them and their problems in a warm professional manner. The work is not always a relaxing, pleasurable experience. The process of strengthening discipline and changing behavior can temporarily arouse anxiety and negative attitudes. Music therapists must be able to deal with these problems when they arise and use tact and resourcefulness in solving them. They often must work in close cooperation with therapists in other disciplines when physical facilities are shared to plan and schedule activities. Standard work hours are usual, but music therapists may be called on from time to time to work evening hours and weekends.

### Job Requirements

The amount and type of professional training and preparation required for employment as a music therapist often varies from employer to employer, and there are people working in the field who have advanced degrees and others who are not trained in academic institutions. However, as the field grows, standard educational requirements are being more rigidly established. The minimum training and preparation currently recommended by the two associations that certify and register music therapists includes a baccalaureate degree in music therapy plus completion of a 6-month internship in an approved facility. It is to the student's advantage to attend a school which combines clinical experience and classroom work at the same

time. Courses leading to the bachelor's degree in music therapy include psychology, sociology, music therapy, anthropology, music, and general education courses.

Licensure is not required of music therapists at the present time except for those working in public schools, who must be licensed as special educators in the State in which they are employed. Certification and registration may be obtained from the American Association for Music Therapists or the National Association of Music Therapists on completion of both the prescribed academic course of study at a recognized university and a 6-month clinical internship at an approved clinical-training facility. Certification and registration are not required for employment, but many employers include eligibility for them as part of their hiring policy.

## Opportunities

Employment prospects depend very much on health-care trends, economic conditions, and the role of government in health care, and projections are difficult to forecast. However, today, music therapy is being used in a wider variety of treatment institutions than ever before and has been gaining acceptance as an alternate form of traditional health care. If these two trends continue it should have a favorable influence on the demand for music therapists.

Many fields are an end in themselves, and those who enter them usually enter with the aim of making a career of performing the work they have chosen. Teaching is such a field and so is music therapy. Music therapists usually enter this career field because there is something stimulating about working with people in a therapy situation that involves music. There are rewards within the field itself and there is always the possibility of being recognized for outstanding accomplishments or for having developed new and innovative methods. Advancement is possible in this field but almost always requires the music therapist to devote less time to actual music therapy and more to administrative duties. For example, the usual path of advancement is from music therapist to department supervisor, coordinator of an activities therapy department, or other related administrative position. So, in addition to the advancement requirements of experience and/or additional education, the therapist must agree to accept an administrative position in order to be promoted. One other avenue of what might be considered advancement, but is often thought of as a separate career area, is university teaching. For a teaching position, the music therapist will need both clinical experience and a graduate degree.

DOT Code: Music Therapist 076.127-014

For further information, contact:
American Association for Music Therapy
National Association for Music Therapy

## Occupational Therapist

### Occupational therapist, registered (OTR)

Occupational therapists are health professionals who provide services to all types of individuals whose lives have been impaired by physical, psychological, or developmental problems. They assist these individuals to achieve the highest level of functioning possible and to reduce or eliminate the need for continued health-care services. Like most of the other health professionals, occupational therapists usually work as a member of a medical team, which may include a physician, physical therapist, vocational counselor, and other related professionals. The team members examine the patient in terms of their individual specialties and consult with each other to arrive at an overall evaluation of the patient's capacities, skills, and abilities. Occupational therapists study those aspects of the evaluation related to occupational therapy and discuss them with the patient. Together they develop short-and long-term goals and the means by which they may be achieved. It is a complex process, and many factors are taken into consideration as a course of therapy is developed.

Therapists select appropriate activities that are suited to the physical capacity, intelligence level, and interests of each patient. These activities are designed to develop independence, prepare patients for a return to work, restore basic functions, and aid in adjustment to disabilities. The course of therapy almost always involves goal-directed activities because these activities are the primary therapy tools. For instance, occupational therapists may help patients develop an interest in ceramics, jewelry making, woodworking, weaving, or other craft activities that will improve motor skills, strength, endurance, concentration, motivation, or other physical and/or mental capacities. Other patients might be enrolled in classes which will help them prepare for specific occupational goals or develop the functional skills, abilities, and capacities needed for the tasks of everyday living.

Beside the ability to teach and to communicate with handicapped people, and a solid background of knowledge of the physical sciences and medicine, occupational therapists need specific knowledge in the various working skills used in therapy. Among these skills are leatherwork, jewelry making, ceramics, woodwork, metalwork, textile crafts, and printing. They also need to know the skills of daily living and simple homemaking. In addition to planning, directing, and participating in therapeutic goal-directed activities, occupational therapists also make and apply splints; provide patients with guidance and instruction; assist in the selection and use of equipment to help patients adapt to the environment and/or impairment; recommend changes in home or work environments to promote the patient's safety and ease of function; and determine or develop other appropriate treatments and activities. Therapists may also organize educational activities, such as the study of language or creative writing, or may organize dramatic groups. For activities such as these, they generally call upon the assistance of a professional in the particular field. Though they cannot be expert in all these activities, occupational therapists must know enough about them to understand their therapeutic values and to set them into motion.

Often physical or mental disability is so severe that patients can no longer work in their former occupations or professions. In such cases, therapists may discover some other skill or talent which patients can develop and use, and this becomes the goal of the therapy. Occupational therapists regularly prepare reports for the information of members of the health team. A report may cover, for example, an account of the progress of a physically disabled patient who has been assigned tasks of increasing difficulty. Or it may cover the progress being made by crippled children in developing muscle coordination through play with therapeutic toys.

While there are no recognized areas of specialization in this career, occupational therapists do tend to work with certain types of disability and age groups. For instance, of the occupational therapists engaged in direct service, approximately 60 percent work principally with persons who have physical disabilities and 40 percent work with patients who have psychological or emotional problems. Twenty-five percent work exclusively with persons under the age of 20, and 10 percent work exclusively with the aged. Occupational therapists are employed in a variety of facilities. Hospitals—including short-and long-term general, psychiatric, and other specialties—appear to be the major single employer of occupational therapists, employing approximately 40 percent of the total employed, while rehabilitation centers and schools each employ about 15 percent. Skilled nursing or intermediate-care facilities hire just under 10 percent, and about 5 percent find work in community mental-health programs. The remainder are scattered among private practice, home-health agencies, educational settings, day-care centers, and similar institutions. Working conditions are generally considered good but do vary among facilities.

The actual range of conditions might be best described as running from adequate to excellent, but there are many factors of a highly personal nature that go into such a judgment. An individual who is interested in an occupational therapy career should visit some facilities that employ occupational therapists to form an individual opinion.

## Job Requirements

Persons considering this career must be able to work with people of all kinds and all ages, with temperaments and personalities that are likely to be as varied as patient illnesses and handicaps. To gain their confidence, it is necessary to have a warm, friendly personality that inspires both trust and respect. In addition to these qualities, it is also necessary to have ingenuity and imagination in adapting activities to individual needs. The potential therapist also needs to be skilled, patient, and resourceful in teaching, since patients often present unusual and difficult learning problems. This occupation offers an excellent opportunity to combine an interest in teaching with an interest in helping people in distress and extreme need.

The educational preparation for occupational therapy requires 4 years of college training leading to the degree of bachelor of science. All occupational therapy programs offered by colleges and universities are approved by the American Medical Association's Committee on Allied Health Education and Accreditation, in collaboration with American Occupational Therapy Association.

In addition to the 4 years of academic preparation, a clinical training period is required in order to qualify for professional registration. In most schools, this clinical experience takes from 6 to 9 months.

For those who already have a degree before enrolling in a program of occupational therapy, there is an advanced-standing course of from 18 to 22 months, divided between academic and clinical work. There are also master's degree programs offered in several universities.

Although supervised clinical experience is part of all the approved programs, compensation during this period varies widely. Some institutions offer no compensation at all, others provide maintenance, and still others give a cash stipend in lieu of maintenance. The college preparation for occupational therapy emphasizes physical and behavioral sciences such as anatomy, physiology, neurology, psychology, and sociology. Other subjects include manual and creative skills, educational subjects, and recreational activities.

In 1977, 56 U.S. colleges offered programs in occupational therapy leading to the required degree and accredited by the American Medical Association and the American Occupational Therapy Association.

Graduates of accredited schools of occupational therapy are eligible to take the national registration examination conducted by the American Occupational Therapy Association. On successful completion of the examination, therapists become professionally qualified to practice and are entitled to use the initials OTR after their name. In addition to this, they automatically become certified and are eligible to become members of the association.

## Opportunities

Since 1970, the occupational therapy profession has experienced a growth rate averaging nearly 10 percent per year. While no one can predict the future with absolute certainty, it is anticipated that employment in this occupation will continue to grow. However, the number of occupational therapy graduates is increasing every year and new graduates are expected to balance the demand created by new openings and replacement needs caused by those who leave the field for one reason or another. Therefore, there may be considerable competition for available positions, particularly in the more desirable areas. Prospective occupational therapy students are advised to check with professional occupational therapy associations, schools, and facilities that employ occupational therapists to obtain information on current needs and trends.

The usual path of advancement in this work is from staff therapist, usually the occupational therapist's first job, to senior therapist, after gaining approximately 3 years experience, to supervisor/administrative therapist, after approximately 5 years experience. Advancement, of course, is not automatic but is based on the occupational therapist's professional growth, development, and often additional education. Also, changes in this progression are not uncommon and other types of related advancement positions are possible. For instance, sometimes occupational therapists work under independent contract either providing direct occupational therapy or consulting services. Another possibility is teaching, in which the steps leading toward advancement are completely different.

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DOT Code: Occupational Therapist 076.121-010

For further information, contact:
American Occupational Therapy Association

## Occupational Therapy Assistant

Occupational therapy assistants work under the direction of professional occupational therapists in carrying out rehabilitation programs. They relieve the therapists of many routine tasks, allowing them to serve a greater number of patients. Therapists and assistants are partners in the rehabilitation of patients impaired by physical, psychological, or developmental problems.

Occupational therapy assistants help occupational therapists to plan and carry out educational, vocational, and recreational activities programs aimed at helping patients to regain the use of those capacities that remain after accident, disease, or deformity. They teach and assist patients to develop skills in self care and in work-related, creative, and recreational activities. Since they work very closely with patients, occupational therapy assistants observe them and make reports to the occupational therapist on the patients' progress and development. In addition, occupational therapy assistants perform many other tasks such as ordering, preparing, and laying out materials; helping to make splints, braces, and other assistive devices; and maintaining tools and equipment. While there are no recognized specialization areas in this career, occupational therapist assistants tend to be assigned to work with certain types of disability or age group populations. For instance, one therapist may work almost exclusively with physical disabilities, another with psychological or emotional problems, a third may work exclusively with patients under 20 years of age, and a fourth may work only with the aged.

Many types of facilities located throughout the country employ occupational therapy assistants. Hospitals are the largest employer, employing about 50 percent. The remainder are divided among nursing homes, schools for handicapped children and the mentally retarded, rehabilitation and day-care centers, clinics, and similar institutions. Working conditions are generally considered good, although they vary from facility to facility. However, since many personal factors go into making an evaluation of facilities and working conditions, the prospective occupational therapy assistant should visit several facilities that employ occupational therapy assistants to form an individual opinion.

### Job Requirements

High school graduates can prepare for this career by completing a 2-year associate degree program in an accredited university or junior or community college. These programs include a minimum of 2 months of supervised practical experience. They also include courses covering structure and function of the human body, growth and development from childhood to old age, physical disability, and mental illness. In addition, there is training in therapeutic skills and crafts. Graduates of a program approved by the American Occupational Therapy Association are eligible for certification as an occupational therapy assistant (COTA) if they meet specified education and experience requirements. At present, there are no licensure requirements for occupational therapy assistants. Continuing education is not a requirement for occupational therapy assistants. However, additional course work not only keeps the assistant up to date on what is happening in the profession but helps to develop expertise, making the employee more valuable and more qualified for promotion.

### Opportunities

The demand for occupational therapy assistants is expected to continue to grow at a steady rate, at lest through the middle 1980's. The number of training programs offered by schools is also expected to increase, but the supply of graduates is expected to fall short of the demand for qualified occupational therapist assistants. The best possibilities for advancement are in the larger facilities, where assistants may be given more and more responsibilities as they gain experience. After occupational therapy assistants have completed 4 years of acceptable experience, they are eligible and may apply to take the American Occupational Therapy Association examination to become occupational therapists.

DOT Code: Occupational Therapy Assistant 076.364-010

For further information, contact:
American Occupational Therapy Association

## Orthotic-Prosthetic Technician

Orthotic-prosthetic technicians make, repair, and maintain orthotic and prosthetic devices, under the guidance of an orthotist/prosthetist. Orthotic devices include braces and surgical supports, while prosthetic devices refer to such items as artificial limbs or plastic cosmetic devices. Technicians, working under the supervision of a orthotist-prosthetist, follow prescription

specifications to determine the type of device to be made and the tools and materials required. When working with orthotic devices, they bend, form, and fasten parts of metal braces to conform to measurements, using a variety of handtools. They shape plastic and metal around casts of the patients' body or limbs and cover and pad brace structures with such materials as rubber, plastic, leather, and felt.

When working on prosthetic devices, they lay out the work; mark the sizes of parts, using precision measuring instruments; and follow prescribed specifications. Using many kinds of tools and a variety of materials such as wood, plastic, metal, or fabric, they make parts to assemble into different types of prostheses.

Orthotic-prosthetic technicians are also responsible for repairing and maintaining orthoses and prostheses as directed by the orthotist/prosthetist. Although technicians do not take part in direct patient care activities, they have the important responsibility of insuring that the workmanship and quality of devices produced meet acceptable standards. Technicians can specialize in orthotics or in prosthetics, or, when qualified, can perform in both orthotics and prosthetics.

## Job Requirements

The American Board for Certification in Orthotics and Prosthetics registers orthotic-prosthetic technicians who meet specific requirements. Candidates for registration must have at least a 10th grade education and have a minimum of 2 years of work experience in making orthoses and/or prostheses. This experience must have been obtained under the supervision of a Certified Orthotist (CO), Certified Prosthetist (CP) or a Certified Prosthetist-Orthotist (CPO). Candidates who have completed a formal educational program in orthotics or prosthetics given in an institution accredited by the board are not required to meet the experience requirements. In addition, candidates must qualify on an examination administered by the board.

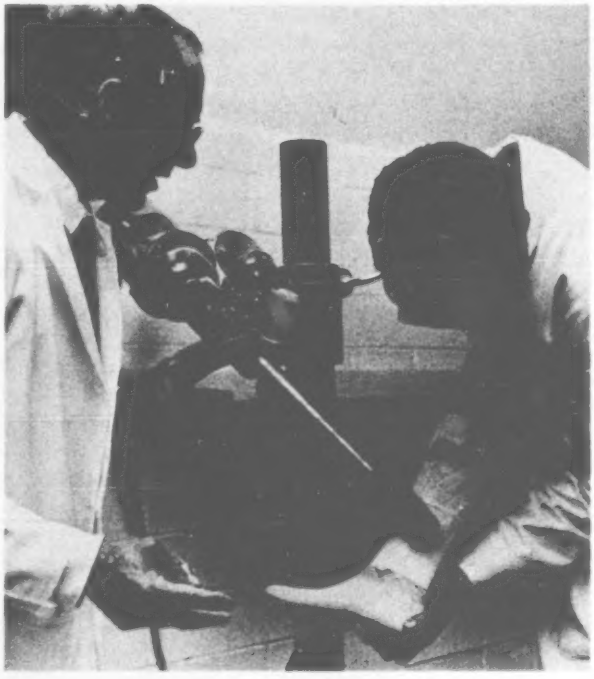
Candidates who pass the technician examination in orthotics are awarded the designation of Registered Technician (Orthotics) RT (O). Candidates passing the examination in prosthetics are designated as Registered Technician (Prosthetics) RT (P). Those who pass the combined examination for orthotic-prosthetic technician receive the designation of Registered Technician (Orthotics-Prosthetics) RT (OP).

## Opportunities

Employment prospects for qualified orthotic-prosthetic technicians are generally favorable and are expected to remain so during the next several years. Advancement opportunities in this field are good and are based on work experience and completion of further education and training. By meeting prescribed training and education requirements, technicians can advance to the practitioner-level positions of Certified Orthotist, Certified Prosthetist, or Certified Prosthetist-Orthotist.

| DOT Code: | | |
|---|---|---|
| | Orthotics-Prosthetics Technician | 712.381-034 |
| | Orthotics Technician | 712.381-034 |
| | Prosthetics Technician | 712.381-038 |

For further information, contact:
American Orthotic and Prosthetic Association



# Orthotist

Orthotists provide care to persons with limb or spine disabilities by fitting and making devices called orthoses. These devices are orthopedic braces which support weakened body parts or help to correct physical defects such as spinal deformities. Orthotists work with physicians, following physicians' prescriptions or helping to develop prescriptions for orthoses. They examine and judge patients' orthotic needs and make

recommendations based on individual problems. Orthotists are responsible for designing each orthosis; selecting proper materials; and making all measurements, model changes and layouts of designs. In addition, they are responsible for making sure that the devices fit and work properly, for making necessary adjustments, and for teaching patients the use and care of these devices.

Orthotists maintain accurate patient records and keep up with developments in this field in order to provide patients with the best possible care. They supervise orthotic/prosthetic technicians and other laboratory workers involved in making orthoses. They lecture and teach their specialty to colleagues or others who are interested in this field or work in research activities. Some orthotists are qualified to function as prosthetists and provide patients with artificial replacements for limbs or other body parts. In such cases they carry the professional designation of prosthetist-orthotist.

Orthotists are employed in privately owned facilities or laboratories; rehabilitation centers; hospitals; and Federal, State, and local rehabilitation agencies.

## Job Requirements

Persons considering this career area must have skillful hands, be able to work with various types of tools, and possess mechanical ability. In addition, candidates must show patience and have a responsible attitude toward their work and a concern for detail and accuracy. Candidates must also be concerned for the welfare of the disabled and be able to communicate with both patients and members of the rehabilitation team. High school courses considered useful in preparing for this career include physics, chemistry, mathematics, biology, and shop courses in metal, wood, and plastics.

The American Board for Certification in Orthotics and Prosthetics is the certifying agency for professional practitioners in this field. They set education and training standards for othotists and administer an examination to all candidates applying for certification status. The usual method of preparing for practitioner certification is to obtain a bachelor's degree in orthotics from an accredited college or university, combined with 1 year of clinical experience. However, persons who hold an associate degree in orthotics or another area can also qualify by completing three special courses in orthotics at an accredited training facility and obtaining 2 years of clinical experience. Persons with a bachelor's degree in a different area of specialization may also qualify for practitioner certification by completing postgraduate training in orthotics, ranging in length from 4 to 8 months, combined with 1 or 2 years of acceptable work experience. Beginning in 1980 the minimum educational requirement will be a bachelor's degree.

Candidates who pass the certification examination are awarded the designation of Certified Orthotist (CO). Those orthotists who are also qualified to practice as prosthetists, and who pass the examination in both specialties, are given the designation of Certified Prosthetist-Orthotist (CPO).

## Opportunities

Employment opportunities for qualified orthotists are generally good and are expected to remain so during the next several years. Advancement in this field takes different forms, depending on the employment location, but is generally based on work experience and skill level. Orthotists can advance to supervisory and administrative positions, and in some cases may become self-employed as private practitioners.

| DOT Code: | Orthotist | 078.261-018 |
|---|---|---|
| | Orthotist-Prosthetist | 078.261-018 |

For further information, contact:
American Orthotic and Prosthetic Association

# Physical Therapist

### Physiotherapist

Physical therapists are health-care practitioners who plan and adminster physical treatment for patients referred by a physician in order to restore bodily functions, relieve pain, and prevent disability following disease, injury, or loss of a body part. Physical therapy has value in the treatment of a wide variety of diseases and injuries, such as multiple sclerosis, nerve injuries, chest conditions, amputations, fractures, arthritis, and cerebral palsy. Initially, physical therapists review and evaluate the patient's condition and medical records, perform indicated tests or measurements, and evaluate the findings. They use the findings to establish a patient care plan which includes setting short- and long-term goals and appropriate treatment procedures for the patient. The goal of physical therapists is to help patients to reach maximum performance levels and to regain a place in society while adjusting to the limiting effects of disabilities. When meeting a patient for the first time, physical therapists, like physicians, keep in mind the importance of preparing the patient emotionally for what is to come. They must be sensitive to the

problems of the patient, who is made vulnerable by disability or disease.

Since treatments may be prolonged and often require active participation, the full cooperation of patients is very important. As a first step, therefore, physical therapists familiarize themselves with the patients' personal backgrounds, as well as their medical histories, and make an effort to gain their confidence and cooperation. The therapist-patient relationship often determines success or failure in involving patients in their own treatment. This is especially true of children. When working with children, therapists must do their best to help the parents as well as children to understand the treatment.

As members of the health team, therapists help patients overcome their disabilities through the use of exercise, heat, cold, electricity, ultasound, and massage. To carry out these tasks, therapists must have detailed knowledge of human anatomy and physiology and know what steps may be taken to correct disease and injury.

For example, in the case of children with a birth defect, physicians call upon physical therapists who may perform a muscle evaluation in order to determine the extent of the damage. On the basis of the muscle test, plans are made for the kind of physical therapy the children need. Physical therapists then carry out the plan of treatment.

In working with such children, physical therapists give the exercises that restore weakened muscles to normalcy. Treatment may include water exercises in warm baths or pools, hot packs, electricity (currents that stimulate paralyzed muscles), ultraviolet rays, and massage. When children must be fitted with braces or crutches, therapists teach walking with the aid of these appliances.

Treatment can be more effective and progress faster if patients and their families understand the purpose and plan and know just how they can help. Physical therapy services include instructing patients and their families in how to carry on prescribed treatment programs at home. They may need specific instruction in the techniques of muscle reduction or in the care and use of braces or prosthetic appliances. Physical therapists may personally conduct the treatment program or supervise a program conducted by a physical therapist assistant.

Physical therapists work in hospitals, rehabilitation centers, nursing homes, home-health agencies, public health agencies, school districts, private practices, and the armed forces. Therapists usually work closely with other people including the patient, patient's family, and other health-care practitioners. Physical therapists are generally required to be physically fit, since the practice of physical therapy requires the worker to lift, climb, stoop, stand, and kneel. Additionally, therapists should have manual dexterity, good visual acuity and hearing, and be able to communicate both orally and in writing.

## Job Requirements

Adaptability, emotional stability, tact, and an outgoing personality are necessary in this profession. Physical therapy also takes a great deal of patience and the ability to work toward a long-range goal, even though the progress may sometimes seem slow. There are three education plans which prepare students for professional qualification in physical therapy. The first is a 4-year program leading to a bachelor's degree in physical therapy. The second is a 12- to 16-month certificate program for students who hold a bachelor's degree in a subject other than physical therapy. And last is a 2-year graduate program which leads to a master's degree for students with a bachelor's degree and the necessary background. Each of these plans includes a minimum of 4 months of clinical education and experience in health-care facilities where students care for patients under the supervision of a qualified physical therapist. The basic curriculum of an accredited program in physical therapy is generally divided into several areas: a liberal arts program which emphasizes the humanities and social studies; study of biological sciences including anatomy, physiology, and pathology; and a major emphasis in physical sciences like chemistry and physics, including the fundamental principles of mechanics, thermodynamics, light, sound, and electricity. Specialization courses provide the fundamental knowledge and skills required to treat patients, and supervised clinical practice is necessary to complete the course. Both the American Medical Association's Committee on Allied Health Education and Accreditation and the American Physical Therapy Association independently accredit educational programs in physical therapy.

All States, the District of Columbia, Virgin Islands, and Puerto Rico require licensure to practice physical therapy in the U.S. Each State, the District of Columbia, Virgin Islands and Puerto Rico have their own licensing requirements, and physical therapists must comply with the legal requirements of the area in which they practice.

## Opportunities

Employment prospects for qualified physical therapists are expected to be favorable through the next decade. Many openings go unfilled each year because of the lack of physical therapists and the maldistribution of those who are available. In the near future, the greatest demand for physical therapists is expected in primary health care and preventive services, as well as in the traditional areas of rehabilitation.

Physical therapists can advance in several different ways. They may advance from staff physical therapist positions in hospital physical therapy departments to department director, and, if the service is large enough, they may advance to coordinator or director of rehabilitation services. Therapists who have a master's degree can advance to supervisory, administrative, or teaching positions.

DOT Code: Physical Therapist 076.121-014

For further information, contact:
American Physical Therapy Association

# Physical Therapist Assistant

**Physical therapy assistant**
**Physical therapy technician**

Physical therapist assistants are skilled health practitioners who administer physical therapy to patients in treatment programs, under the direction of qualified physical therapists. They generally work with patients who have relatively stable conditions and use a variety of treatment techniques. They administer exercises; massage; heat, light, sound, water, electrical and infrared treatments; and use hot or cold packs to treat patients. Assistants instruct and assist patients to learn or improve their ability to walk, climb, and move from one location to another and to acquire skills needed for daily living. They observe patients during treatment to gather information on their responses and progress and report findings to the physical therapist, either orally or in writing. They also instruct patients in the use and care of artificial limbs, braces, and other devices such as crutches, canes, walkers, and wheelchairs.

Physical therapist assistants are employed in hospitals, rehabilitation centers, nursing homes, home-health agencies, public-health agencies, schools, private practices, and the armed forces.

Assistants work closely with patients, the patients' families, and other health-care personnel. They must be physically and mentally fit and be able to lift, climb, stoop, stand, and kneel. Additional requirements for physical therapist assistants are good hearing and visual acuity and the ability to communicate both orally and in writing.

## Job Requirements

Preparation for this career area includes completion of high school and graduation from a 2-year accredited program leading to an associate degree in physical therapy. These programs are offered in junior and community colleges and combine academic studies with supervised clinical experience.

There are licensing requirements for physical therapist assistants in 23 States. The licensure boards in these States administer an examination to applicants who meet the qualifications set forth in the State Physical Therapy Practice Act. At present, there are no certification requirements for physical therapist assistants. For information about licensing requirements, candidates should contact the appropriate State licensing agency.

## Opportunities

The employment prospects for physical therapist assistant are good through the next several years. This outlook is based on the trend toward expanding physical therapy programs in many different types of facilities and on increased public awareness of the need for professional rehabilitation services.

Advancement in this work is based on work experience, which leads to greater responsibilities, and on advanced education. Assistants who engage in continued education can become fully qualified therapists by completing an accredited program of study.

DOT Code: Physical Therapist Assistant 076.224-010

For further information, contact:
American Physical Therapy Association

# Prosthetist

Prosthetists provide care to persons with partial or total loss of a limb by fitting and [illegible] artificial limbs known as prostheses. They consult with a physician, follow physician prescriptions, or help in developing prescriptions for the prostheses. Prosthetists talk with and examine patients and make recommendations for meeting their individual needs. After taking careful and accurate measurements and making any needed casts, they design the prosthesis, select the necessary materials, and prepare a layout of the design. Before completing the final model, they give the patient a fitting and make any necessary adjustments to insure that the device gives the patient comfort and function. Prosthetists instruct patients in the use and care of devices, maintain complete records of patient activity, and provide patients with the best possible care by keeping current on new technology in this field. Prosthetists supervise orthotic/prosthetic technicians and other laboratory workers engaged in making prostheses. Prosthetists engage in teaching activities or perform research work in this field. Some prosthetists are qualified, by additional training, to function as orthotists. In such cases they carry the professional designation of prosthetist-orthotist.

## Job Requirements

Persons considering this career area must have manual dexterity, be able to work with various types of tools, and possess mechanical ability. In addition, candidates must display patience, have a responsible attitude toward their work, and have a concern for detail and accuracy. Candidates must also have a sense of concern for the welfare of the disabled and be able to communicate effectively with both patients and members of the rehabilitation team. High school courses considered useful in preparing for this career include physics, chemistry, mathematics, biology, and shop courses in metal, wood, and plastics.

The American Board for Certification in Orthotics and Prosthetics is the certifying agency for professional practitioners in this field. They set education and training standards for prosthetists and administer an examination to all candidates applying for certification. The usual method of preparing for practitioner certification is to obtain a bachelor's degree in prosthetics from an accredited college or university, combined with 1 year of clinical experience. However, persons who hold an associate degree in prosthetics or another area can also qualify by completing three specified courses in prosthetics at an accredited training facility and obtaining 2 years of clinical experience. Persons with a bachelor's degree in a different area of specialization may also qualify for practitioner certification by completing post-graduate training in prosthetics, ranging in length from 4 to 8 months, combined with 1 or 2 years of acceptable work experience. Beginning in 1980, the minimum educational requirement will be a bachelor's degree.

Candidates who pass the certification examination are awarded the designation of Certified Prosthetist (CP). Those prosthetists who are also qualified to practice as orthotists, and who pass the examination in both

specialties, are given the designation of Certified Prosthetist-Orthotist (CPO).

## Opportunities

Employment prospects for qualified prosthetists are generally favorable and this trend is expected to continue during the next several years. Advancement in this field takes different forms, depending on the place of employment, but is generally based on work experience and level of skill. Qualified prosthetists often move into supervisory jobs, and in some cases may become self-employed as private practitioners.

| DOT Code: | | |
|---|---|---|
| | Prosthetist | 078.261-022 |
| | Orthotist-Prosthetist | 078.261-022 |

For further information, contact:
American Orthotic and Prosthetic Association

# Recreation Therapist

**Activities therapist**
**Recreation specialist**
**Therapeutic recreation specialist**

Recreation therapy is a specialized field in which recreation services are used to help individuals to recover from or adjust to illness, disability, or a specific social problem. Recreation therapists organize, develop, and carry out therapeutic recreational activities which help to meet this goal. These recreational programs are carried out in health facilities or community settings and include such activities as athletics, dancing, arts and crafts, music, movies, parties, gardening, and camping. Each of these is used to provide patients with the benefits of exercise, social participation, and group interaction. The therapeutic recreation activities that they conduct are designed to assist patients to develop interpersonal relationships, resocialize, relieve anxiety and tension, and develop confidence needed to participate in social activities.

Recreation therapists are an important part of the health team; they observe the physical, mental, and social progress of patients and contribute information and progress reports for use in meeting treatment goals. Recreation therapists assist patients in readjusting recreational needs to the activities offered by the community in which they live, based on knowledge of community resources and programs. Therapists also train groups of volunteers and students in techniques of recreation therapy. In addition, therapists work with various educational institutions to develop courses in the field of therapeutic recreation.

Recreation therapists are employed in a variety of public and private facilities including State or private hospitals for the mentally ill or mentally retarded; prisons, and juvenile retention homes; orphanages; veterans' hospitals for both general and psychiatric patients; armed forces hospitals; homes for the aged; schools for the blind and rehabilitation centers for the physically handicapped. Others work in day-care centers; clinics; private and public schools; recreation centers; camps; and private community agencies. No general statement can be made about working conditions since they vary widely from facility to facility. Physical handicaps are not barriers to employment in this work as long as the individual has adjusted suitably to the disability.

## Job Requirements

The educational minimum for entry as a professional in this field is a bachelor's degree in recreation, with emphasis on rehabilitation or therapeutic recreation, from an accredited college or university. In addition, students must complete 400 hours of clinical training in a university or college-affiliated hospital.

In some cases, an associate degree or certificate in therapeutic recreation is acceptable for entry into lower level jobs in this field, which involve limited responsibilities.

The American Association for Rehabilitation Therapy (AART) is the registration body for recreation therapists, and although registration is not a condition of employment, many therapists choose to do so. The requirements for registration as a recreation therapist include membership in AART, 2 years experience as a recreation therapist in a health-care facility, letters of recommendation, and copies of college transcripts.

## Opportunities

Employment prospects for recreation therapists are favorable. The job market is expected to expand steadily in line with the expansion of health facilities throughout the country, as well as increases in population, particularly among the aging.

Advancement possibilities for recreation therapists vary widely among facilities, but, in general, promotions are based on experience, skill level, and education. In local, State, and Federal facilities, advancement can be achieved through the traditional methods of competitive civil service. Therapists in lower level positions who have an associate degree or certificate can advance to

professional status in the field by completing the required bachelor's program in recreation. Therapists who obtain a master's degree can qualify for positions in administration, research, and teaching.

DOT Code: Recreation Therapist 076.124-014

For further information, contact:
American Association for Rehabilitation Therapy
National Therapeutic Recreation Society

# Speech Pathologist and Audiologist

**Speech correctionist**
**Speech and language pathologist/audioiogist**
**Speech therapist**

Speech pathologists and audiologists provide specialized help to people with problems of speaking and hearing. Speech-language pathologists are primarily concerned with persons who have speech, language, and voice disorders, while audiologists concentrate on individuals with hearing problems.

The goal of speech pathologists and audiologists is to help children and adults overcome such problems as lisping, cleft palate, impaired hearing and talking difficulties resulting from cerebral palsy, emotional or physical disturbance or retardation, stuttering, or foreign dialect.

Speech pathologists diagnose and evaluate the individuals' speech and language abilities. They plan, direct, and conduct treatment programs to restore or develop patients' communication skills, regardless of the cause of the disorder. Speech pathologists can and do work closely with a number of other professionals, including audiologists, physicians, psychologists, social workers, counselors, physical and occupational therapists, and educators.

Audiologists are concerned with the prevention of hearing impairment and the conservation of hearing in children and adults. Audiologists assess the type and degree of hearing impairment. They then add their findings to educational, medical, social, behavioral, and other diagnostic data. After evaluating all of the available information, they may plan, direct, conduct or participate in aural rehabilitation programs which meet the needs of the individual patient. These programs include such activities as hearing-aid selection and orientation, auditory training, speech reading, speech conservation, counseling, and guidance. Audiologists, like speech pathologists, often work closely with other professionals and as consultants to educational, medical, and other professional groups.

Speech pathologists and audiologists work in public and private schools; colleges and universities; clinics; research centers; hospitals; speech and hearing centers; private industry; private practice; and Federal State, and local agencies.

## Job Requirements

People who seek careers working directly with handicapped children and adults must have a real concern for people with physical and psychological problems and a sincere desire to help them. Equally important is the ability to work with such problems objectively. The potential speech pathologist or audiologist should have a warm, friendly personality that inspires confidence in the person being helped. Patience and perseverance are also needed, since rehabilitation may be a slow process. Relating well to children is a definite asset, since much of the work in speech rehabilitation is done with youngsters.

To qualify as a speech pathologist or audiologist, a person must have a master's degree in speech pathology or audiology. As part of the requirements for the master's degree, an individual will have numerous supervised clinical experiences. The student may also complete sufficient courses to be certified by the American Speech and Hearing Association (ASHA) and/or licensed by his or her State. A number of preprofessional degree programs in speech pathology or audiology are available.

Although programs leading to a master's degree in speech pathology or audiology vary from college to college, course work will include normal development and function of speech, language, and hearing; anatomy and physiology; the nature of disorders of speech, language, and hearing; the evaluation of speech, language, and hearing; clinical methods; and research.

Speech pathologists and audiologists may hold a variety of credentials, including State license, teaching credentials, and the American Speech and Hearing Association's Certificate of Clinical Competence in either or both areas. The ASHA certificates require academic training at the master's level, 1 year of experience in the field, and the passing of a national examination. Since credential and licensure requirements may vary from State to State, the appropriate State agency should be contacted to determine what requirements must be met.

## Opportunities

Employment prospects are expected to increase during the next decade. However, the competition for openings, especially in large urban areas, is expected to be keen.

Speech pathologists and audiologists may advance to administrative or supervisory positions such as clinic director or coordinator of clinical services. They may also become professors or department heads in colleges or universities, or choose to engage in research activities. Professional mobility is generally based on experience, skills, and level of education.

| DOT Code: | | |
|---|---|---|
| | Audiologist | 076.101-010 |
| | Speech Pathologist | 076.107.010 |

For further information, contact:
American Speech and Hearing Association
National Association for Hearing and Speech Action

# Vocational Rehabilitation Counselor

### Rehabilitation counselor

Many different services go into rehabilitation—the process by which a sick or disabled person is restored to normal or near-normal functioning. One form of rehabilitation is concerned with repairing the damage done by illness or injury, and this is the responsibility of the physician. Another form of rehabilitation is concerned with restoring the person to a prior level of vocational performance or, if this is no longer possible, with preparing the individual for a new vocation. This is the function of vocational rehabilitation counseling. Most illnesses leave the patient with little or no residual handicap, while others may cause long-lasting or permanent damage to physical or mental functioning. Handicaps such as these may not only prevent the individual from taking up a former occupation, but may also demoralize the person to a point where the motivation to learn another trade or profession, or the courage to find another job, is no longer present.

Vocational rehabilitation counselors help handicapped or disabled persons to overcome these obstacles. Counselors help these persons decide on a realistic vocational goal and then help them work toward this goal—placement in a satisfactory job. This may involve not only extensive vocational training but also the reshaping of negative attitudes and the development of confidence and motivation. As soon as the injury or illness is brought under control and the patient is able to function again, vocational rehabilitation counselors help the individuals minimize any handicaps by capitalizing on other resources—aptitudes, skills, and interests. For example, counselors cannot create a new pair of eyes for a blinded watchmaker, but they can help by exploring other opportunities where manual deftness can be put to use, as in the production of electrical equipment. Through retraining, disabled workers learn to apply their abilities to new jobs, sometimes closely related, sometimes far removed from their previous work. Even in the case of handicapped or retarded young people who have never worked at all and who may have been considered unemployable, counselors can frequently devise a training program that can lead to employment.

To learn as much as possible about the handicapped person, counselors conduct interviews with the individual, the family doctor, former teachers, former employers, and others. Counselors may administer various aptitude tests and psychological tests or refer individuals to a testing specialist. If emotional problems seem to be interfering with adjustment, psychologists or psychiatrists may be consulted. When enough has been learned about the individual, the next step is to develop a vocational plan. Both individuals and counselors share in the planning, and others who may be involved are also called in—family members, prospective employers or social workers.

The actual training generally takes place in a sheltered job situation, where the trainee may learn a new oc-

cupation without the competitive pressures of regular employment. While training is in process, counselors keep in touch with trainees to observe progress and to be of continued help. When the training is completed, counselors help trainees to find jobs. Counselors make followup visits to insure that individuals are adjusting adequately to the new work situation. To be of greatest help, counselors must know the employment situation and employment opportunities, especially those for handicapped people. In cases where handicapped individuals are unable to enter or re-enter the labor market, counselors work with them to effect the best possible adjustment within family and social situations. In many cases, rehabilitation counselors specialize in services for particular groups—the blind, paraplegics, the mentally ill, and the retarded. In addition, counselors divide their time between counseling and community activities in the interest of the overall program—for example, calling on employers to solicit jobs, keeping in touch with educators and other interested professional groups, and taking part in meetings of local organizations and other activities which will help to focus public attention on problems of the handicapped and the benefits of rehabilitation.

Many vocational rehabilitation counselors work in State and local rehabilitation agencies which are financed by Federal and State funds. They also are employed by Veterans Administration facilities, rehabilitation centers, sheltered workshops, hospitals, labor unions, insurance companies, special schools, and public and private job-placement agencies. Counselors usually observe a typical 40-hour week, although they sometimes participate in various after-hours community activities related to rehabilitation, because of the importance of out-of-office contacts and community relations to vocational rehabilitation. In the course of the day's work, counselors are in touch with many people in many places—with the handicapped and their families, physicians and other members of the hospital staff, professional people in welfare agencies and similar organizations, school people, local public employment offices, employers' groups and individual employers, labor unions, and other sources of jobs or job information.

## Job Requirements

The minimum requirement for a beginner's job in rehabilitation counseling is a bachelor's degree, preferably in psychology or education. However, employers are placing increasing emphasis on a master's degree in this area. Some experience in such related fields as vocational guidance and placement, personnel work, psychology, social work, or teaching also may be helpful. Master's programs require from 1½ to 2 years of study and include courses in rehabilitation problems, counseling techniques, vocational guidance, occupational and medical information, test administration and evaluation, psychology, statistics, and personnel administration. Additional courses may involve the community relations aspect of the rehabilitation program—for instance, public speaking, public relations, and methods of developing local job resources for the disabled. Some rehabilitation counselors take additional graduate work and earn a doctor's degree. This usually takes a total of from 4 to 6 years after college—part of it covered by the time required for the master's degree. Doctoral training usually goes into the more complex aspects of rehabilitation. This is supplemented by advanced work in the social sciences, and (as in other Ph.D programs) the student is expected to complete a considerable amount of original research.

There are currently no licensing requirements for vocational rehabilitation counselors, although licensing bills are beginning to be introduced in some States. However, some State agencies and private employers require some form of testing prior to offering employment, and increasingly they prefer individuals who are Certified Rehabilitation Counselors (CRC's). An individual is certified by the Commission on Rehabilitation Counselor Certification on the basis of an accepted level of competency, which includes both educational requirements and work experience. After receiving the initial certification, Certified Rehabilitation Couselors participate in a certification maintenance program to insure their continued proficiency in the field.

## Opportunities

The present supply of rehabilitation counselors is inadequate to meet the needs of expanding groups of handicapped persons, and opportunities for qualified rehabilitation counselors are expected to remain good throughout the next decade. Counselors with graduate degrees in rehabilitation or a related field have the best opportunity for employment. Rehabilitation counselors can advance to supervisory or administrative positions after gaining sufficient experience and completing advanced training.

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DOT Code: Vocational-Rehabilitation Counselor 045.107-042

For further information, contact:
National Rehabilitation Counseling Association

Veterinary Medicine

198

Veterinarians care for the health of the animal population. Veterinarians are also concerned with preventing and eradicating human diseases transmitted through animals, promoting sound public health practices, and medical research. Because of the demand for veterinary services, career opportunities can be found in private practice, research, or government service.

Veterinarians are often assisted by animal technicians. Animal technicians help veterinarians with the care and handling of animals and perform routine laboratory and office procedures. The need for technicians is growing rapidly, as veterinarians recognize more ways to use their skills.

## Animal Technician

**Animal health technician**
**Veterinary science technician**

Animal technicians play an important part in veterinary medicine by providing assistance to the veterinarian in daily work activities. Technicians trained in such areas as animal care and handling, principls of normal and abnormal life processes, and in laboratory and clinical procedures are qualified to assume many of the routine tasks performed by veterinarians.

Working under the direction of practicing veterinarians, animal technicians gather and record information regarding cases, prepare animal patients for examination, and ready instruments and equipment for use. In addition, technicians collect various specimens; perform standardized laboratory tests; and assist veterinarians in diagnostic, medical, and surgical procedures by preparing medications and applying dressings.

Animal technicians work primarily in veterinary clinics and animal research laboratories. However, these technicians are also employed by drug and feed manufacturers; breeders of laboratory animals; zoos; meat packing companies; medical, dental, and veterinary schools; hospitals; and the public health agencies of city, State, and Federal governments. Technicians employed in situations other than veterinary practice work under the supervision of a scientist or senior technologist and, in addition to the duties previously mentioned, may feed and care for animals and inspect product carcasses. For the most part, animal technicians work regular hours in pleasant surroundings and under favorable working conditions. However, it is important to note that animal technicians risk being physically injured by certain animals and are exposed to animal diseases which may be communicable.

### Job Requirements

Most animal technicians complete a 2-year program leading to an associate's degree from a community college offering a training program accredited by the American Veterinary Medical Association. Typically, the training programs cover 2 academic years of college level study and require completion of general courses in biology, chemistry, communications, mathematics, economics, and business management, as well as specific courses covering such subjects as physiology, nutrition, microbiology, parasitology, animal care, laboratory procedures, clinical techniques, radiology, toxicology, ethics, and client relations. Practical experience with live animals and field experience under actual working conditions are important parts of most programs.

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A high school diploma or equivalency certificate evaluated on an individual basis is required by most community colleges offering an associate degree in animal technology. Also considered in the selection of candidates are aptitudes, interests, and the ability to profit from the courses offered. Generally, a strong background in high school science courses, mathematics, and English is most useful to college candidates. In some cases, individuals without formal educational credentials enter this field through on-the-job training in the basic levels of animal care. However, they have considerably less opportunity to attain supervisory or advanced positions and are encouraged to engage in continuing education in this field.

A number of States have recently established certification programs for animal technicians, and several more probably will do so in coming years. Programs vary from State to State, with some established by veterinary medical examining boards and others by State veterinary medical associations. Some require formal education in an accredited program, while others accept on-the-job training. Some issue licenses to those who meet requirements, while others issue certificates or simply register qualified technicians.

One of the professional groups which provides certification in this field is the Animal Technicians Certification Board sponsored by the American Association for Laboratory Animal Science. The board provides examinations and a registry for technicians who are eligible and employed in laboratory animal facilities. The following certification titles used by this organization are based on levels of competency and are not job classifications.

- Assistant Laboratory Animal Technician. This is a first-level position and involves the basic care of animals. Candidates for this classification examination must have 1 full year of work experience and have successfully completed an approved course for assistant technician.
- Laboratory Animal Technician. This is the second level of certification and requires 3 years of employment in laboratory animal technology. Graduation from a 2-year laboratory animal technology school may be substituted for 2 years of experience.
- Laboratory Animal Technologist. This is the third level of competency, and requires 6 years of experience. Credit is allowed when the candidate has completed biological and laboratory animal courses. This worker is qualified to perform high-level tasks, such as training subordinates and assisting with research experiments.

## Opportunities

Employment opportunities for animal technicians appear to be good as veterinarians continue to recognize more ways to use qualified technical assistants. The survey of accredited animal technician training programs conducted by the American Veterinary Medical Association (AVMA) revealed that graduates of these programs have excellent job prospects. Continued prosperity is expected to bring more pets into homes, while the need for protection may increase the number of watchdogs used in homes and businesses. In rural areas, the need for animal technicians is expected to increase along with the population as more animals are bred for use as food. The increasing number of animals used for riding and racing also will require medical care and treatment. There are approximately 30,000 veterinarians in this country actively engaged in some form of professional activity. The AVMA estimates that approximately one animal technical is needed for each veterinarian.

Experience and continuing education are necessary to advance in this field. For technicians or assistants who begin with on-the-job training, completing a formal degree program should enhance advancement. In some laboratories employing a number of technicians, advancement to positions with considerable supervisory responsibility is possible for qualified individuals.

DOT Code: Animal Technician 410.674-010

For further information, contact:
American Association for Laboratory Animal Science
American Veterinary Medical Association

# Veterinarian

The care of farm animals and pets is a practice as old as civilization itself. In the past, people lived in close association with animals and soon realized that, like human beings, they were subject to many ills, making them unfit for food, work, or companionship. Practical experience taught people that animals could transmit disease to humans. In older civilizations, the same "medicine man" treated both animals and human beings.

Today, veterinarians have the responsibility for animal health care, and are key figures in general disease prevention programs.

Veterinarians are important to farmers, pet owners, and other animal owners. Untreated bovine disease can

ruin a diary farmer, and the loss of a beloved pet can be a very traumatic experience to its owner. But veterinary medicine is just as important to people who don't own animals. When they buy milk, meat, poultry, and eggs, consumers benefit from the veterinarian's services—from efforts to keep food-producing animals in good health and from inspection of foods of animal origin.

Humans also benefit from veterinarians' work in controlling animal diseases which spread to human beings. Rabies, brucellosis, and the form of food poisoning known as salmonellosis are among these diseases.

A majority of veterinarians—an estimated 76 percent—go into private practice. Veterinarians in private practice strive to prevent disease and other health problems by examining their animal patients, immunizing them against diseases, and advising owners on ways to keep pets and livestock healthy. The practitioners diagnose and treat animal patients and frequently require the use of laboratory tests, X-rays, and specialized equipment. Treatment involves a number of procedures such as administering emergency lifesaving measures, prescribing medication, setting fractures, performing surgery, or advising patients' owners on feeding and care. Rural veterinarians generally practice with cows, horses, swine, or poultry. Veterinarians living in cities or large towns usually treat only household pets but may also care for farm animals. A small number of veterinarians specialize in zoo and circus animals or in animals that are raised commercially for their fur.

Veterinarians who begin private practice in a farming area must count on investing several thousand dollars in drugs, instruments, and an automobile, in order to provide needed treatment and reach patients.

Rural veterinarians who develop large practices sometimes build clinics or hospitals where animals can be brought for treatment and surgery, but many practice from offices and travel to their patients. They make use of many modern methods of communication and transportation. It is not at all unusual for rural veterinarians to keep in touch with the office by radiotelephone or to fly a plane.

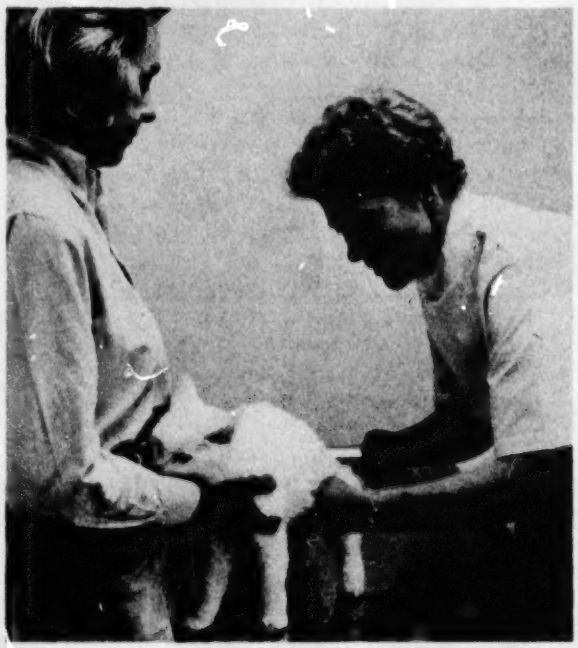
In addition to working with animal patients, rural veterinarians also teach farmers and their families about diseases that farm animals can transmit to people and show them how to protect themselves. Brucellosis, for example, may attack a farmer who is not careful in handling infected cattle; and ringworm in cattle, horses, or smaller pets may spread to the entire family if strict precautions aren't taken.

Rural veterinarians frequently combine private practice with part-time work for Federal, State, or local government. This public service may be concerned with control and eradication of animal diseases or it may involve the inspection of foods of animal origin, such as meat and poultry.

Veterinarians in private practice in cities usually work only with household pets, although they too may do some work for local health departments. City veterinarians usually have a fully equipped animal hospital for their patients—a fact which makes this an expensive specialty for the beginner. Anyone planning to go into such practice should study the community very carefully before making the investment. Often it is better to associate with an established practitioner, as an assistant or junior partner.

Veterinarians fit easily into the public health field, having been trained to consider diseases as they affect animals in groups. Prevention rather than treatment is stressed—and prevention is the keystone of public health.

Many veterinarians work directly in the public health field—for the Federal Government, State, or local agencies, and international groups. For example, the Agricultural Research Service of the U.S. Department of Agriculture has a full-time staff of veterinarians to inspect meat in packing plants and to work throughout the country on the control and eradication of animal diseases. Other veterinarians in this Department super-



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vise stockyards, inspect poultry, and enforce the quarantine regulations, and other laws affecting the import and export of animals and animal products. They also do research work and supervise the licensing of firms manufacturing serums and vaccines for animals. The U.S. Food and Drug Administration also employs veterinarians to help protect consumers of animal food products by assuring the safety and quality of drugs used to treat animals.

A veterinary public health section has been organized in the U.S. Public Health Service. Individuals working in this section develop programs for controlling animal diseases that affect public health, help the States establish veterinary public health programs, and serve as consultants in other Public Health Service activities. Other functions of veterinarians within the Public Health Service are to collect and evaluate statistical data on human illnesses caused by animals, to study the effects of air pollution on animals, and to conduct basic research on chronic and communicable diseases.

Veterinarians employed by State and local health departments cooperate with private practitioners and Federal field workers to control disease among animals and also to protect human health. Some counties and many cities employ veterinarians to see that meats and dairy products are wholesome and that they are sold in clean surroundings. In other instances, veterinarians supervise the production of biologicals—serums, antitoxins—used in the prevention and treatment of disease in human beings.

Internationally, veterinarians are on the central and regional staffs of the World Health Organization and the Food and Agriculture Organization of the United Nations. During the years following World War II, veterinarians worked with the United Nations Relief and Rehabilitation Administration to help war-torn countries build up their supply of food animals. Today they work with the U.S. Foreign Operations Administration to provide economic and technical aid to underdeveloped countries.

Veterinarians interested in a public health career need special training in addition to education in veterinary medicine. It is recommended that after a year or two of practical experience individuals enroll for a program of postgraduate study in an accredited school of public health. Specialized courses will help in understanding how comprehensive health programs are developed and how veterinary medicine can contribute to such programs. This postgraduate work leads to a master's degree—usually Master of Public Health.

Today a new responsibility for veterinarians is membership on the radiological health team in various health administrations. Training courses in radiology and its health aspects are now given to all veterinary officers of the U.S. Armed Forces and also to veterinarians who work in State and local health departments. Veterinarians are likewise playing an important role in civil defense programs—studying how to protect both man and animals against atomic, biological, and chemical warfare.

Progress in veterinary medicine has been greatly influenced by the veterinary activities of the U.S. armed forces. Today commissioned officers of the veterinary corps of the Army and the Air Force work to protect our military personnel stationed in all parts of the world. During World Wars I and II and the Korean and Vietnam conflicts, they were largely responsible for the low incidence of food poisoning and food-borne disease among our troops.

As members of the medical department, veterinary officers cooperate with colleagues—physicians, dentists, nurses, or other specialists—on problems affecting the health of the Armed Forces, in training and in the field, at home and abroad. Veterinary officers have an obligation to protect the Government's pocketbook by rejecting substandard food products and by developing effective ways of preparing, producing, and serving foods. Often these officers, as members of the medical team, work on newly recognized diseases of animals and man and provide medical care to animals used for guard duty and other purposes.

Some veterinarians go into teaching in schools of veterinary medicine, public health, or medicine. Others are employed by firms which produce or sell biological and pharmaceutical products for animal and human use. In industrial fields, veterinarians are employed on a consultant basis.

Whether entering private practice or taking salaried posts, veterinarians are entering a profession with high standards of service.

Veterinarians in private practice usually set their own appointment hours, although emergency services and heavy caseloads may cause irregular work hours. Those working in large animal or mixed animal practices frequently work outdoors, often under difficult weather conditions, and veterinarians always risk injury or exposure to transmittable disease.

## Job Requirements

Anyone planning to become a veterinarian should count on a minimum of 6 years of schooling after graduation from high school. Candidates must complete 2 or 3 years of preveterinary college courses which include basic language arts, social sciences, humanities,

mathematics, and biological and physical sciences prior to entry into a college of veterinary medicine. Candidates then enter an approved college of veterinary medicine, which gives a 4-year course leading to the degree of Doctor of Veterinary Medicine (DVM).

Although only 2 or 3 years of college are required, it is best to have a full 4 years of college work, with a bachelor's degree. The extra years give the student a broader cultural background—and mean that the student has more to offer the profession and the community to be served. Also, competition is keen for entry to schools of veterinary medicine; other things being equal, the college graduate has a better chance of acceptance.

Before entering college, prospective veterinary students should write to veterinary schools and ask about entrance requirements. Since these vary from school to school, it is necessary to have this information before planning college studies. Usually, emphasis is placed on inorganic and organic chemistry, biochemistry, zoology, botany, physics, English composition, and speech.

There are 21 accredited colleges of veterinary medicine in the United States and Canada offering a 4-year professional program leading to a Doctor of Veterinary Medicine degree (DVM). During the first phase, preclinical sciences including anatomy, physiology, pathology, pharmacology, and microbiology are emphasized. Most of the students' time is spent in classroom and laboratory study. The second phase of professional study is largely clinical. During much of this time, students work with animal patients and deal with owners who use the school's clinical services. In some areas of the country, States which do not have veterinary schools of their own cooperate on a regional basis with schools in other States. This helps to equalize opportunities for studying veterinary medicine. Chances of admission in times of crowding are best for students with high scholastic averages. The Council on Education of the American Veterinary Medical Association is the accrediting agency for programs in veterinary medical education.

A license is required for the practice of veterinary medicine in all States and the District of Columbia. To obtain a license, an applicant must be a graduate of an accredited veterinary school and pass a State board examination. A number of State veterinary medical associations have established academies of veterinary practice to encourage and improve continuing education, and the licensing boards of several States have legislated continuing education requirements for relicensure. Veterinarians are not required to complete an internship before going into practice. Even so, many internship and residency programs do exist, and increasing numbers of veterinarians are taking advantage of them. A number of nonpractice positions in government do not require a license, although many veterinarians taking these jobs do have licenses. Licenses granted by one State are not necessarily recognized in others. Therefore, veterinarians must check local rulings before starting practice in another State.

## Opportunities

The employment outlook for veterinarians is favorable, and studies by governmental groups and the National Academy of Sciences have concluded that the demand for veterinary medical services is expected to exceed the supply over the next several years. Unfortunately, there are not enough facilities or teachers available to provide the necessary education; however, all existing colleges of veterinary medicine have recently expanded their teaching programs, and several States are developing plans for establishing new medical schools.

Many opportunities for continuing professional and advanced formal education are available to veterinarians who wish to take advantage of them. Advancement in salaried fields of endeavor such as teaching, research, regulatory work, public health, and military service is particularly enhanced by additional academic work.

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DOT Code: Veterinarian 073.101-010

For further information, contact:
American Veterinary Medical Association

Safeguarding vision—helping people to see better or more comfortably—involves a number of health care professionals, each with special responsibilities and skills.

Ophthalmologists (MD's or DO's) are physicians who specialize in the diagnosis and treatment of defects and diseases of the eye. Ophthalmologists prescribe medical treatment, perform surgery when necessary, and provide other types of treatment including corrective lenses. Ophthalmologists often utilize the services of ophthalmic medical assistants in their practices.

Optometrists (OD's) are health care professionals who specialize in examination, diagnosis, and treatment of conditions of the vision system. Optometric treatment includes prescription of corrective lenses, contact lenses, special optical aids and vision therapy, as well as referral of eye diseases and general health problems to other health care professionals. Optometrists are often supported in their work by optometric technicians and assistants.

Dispensing opticians furnish and fit eyeglasses prescribed by an ophthalmologist or optometrist, and contact lens technicians specialize in providing patients with contact lenses (different States have different laws regulating who may prescribe and fit contact lenses).

Ophthalmic laboratory technicians work in laboratories where they cut, grind, and finish prescription lenses which are assembled with frames to produce finished glasses.

All of the preceding professionals occupy distinctive places in the eye care field and each is discussed in detail in the following pages.

## Dispensing Optician

**Ophthalmic dispenser**
**Optician**

Dispensing opticians produce and fit eyeglasses or lenses prescribed by the ophthalmologist or the optometrist. They measure facial contours in order to select the frame and lens shape best suited to the individual's features, and then have the lenses ground according to the prescription and patient's measurements. Finally, they place them into the assembled frame and fit and adjust the finished glasses.

In addition to eyeglasses, dispensing opticians also fit contact lenses. In fitting contact lenses, dispensing opticians follow the ophthalmologist's prescription, just as they do in filling conventional glasses. But with contact lenses they must also obtain accurate measurements of the cornea of the eye. This requires working skillfully with precision instruments which measure the power and curvature of the lens. Dispensing opticians provide instructions to users on how to insert, remove, and care for contact lenses initially, and, during followup visits, they examine the patient's eyes, cornea, lids, and lenses, using special instruments and equipment.

Opticians with large practices often employ other opticians, known as dispensers, to do the work of interpreting prescriptions and fitting lenses. They usually have a room where the benchwork on glasses is done—where the lenses are edged to fit the frame and then assembled with the frame into the finished glasses. Although the actual grinding of the surfaces of the lenses may also be done in the optician's shop, this service is also available through jobbers and wholesalers. In either case, such mechanical work is done by an optical technician.

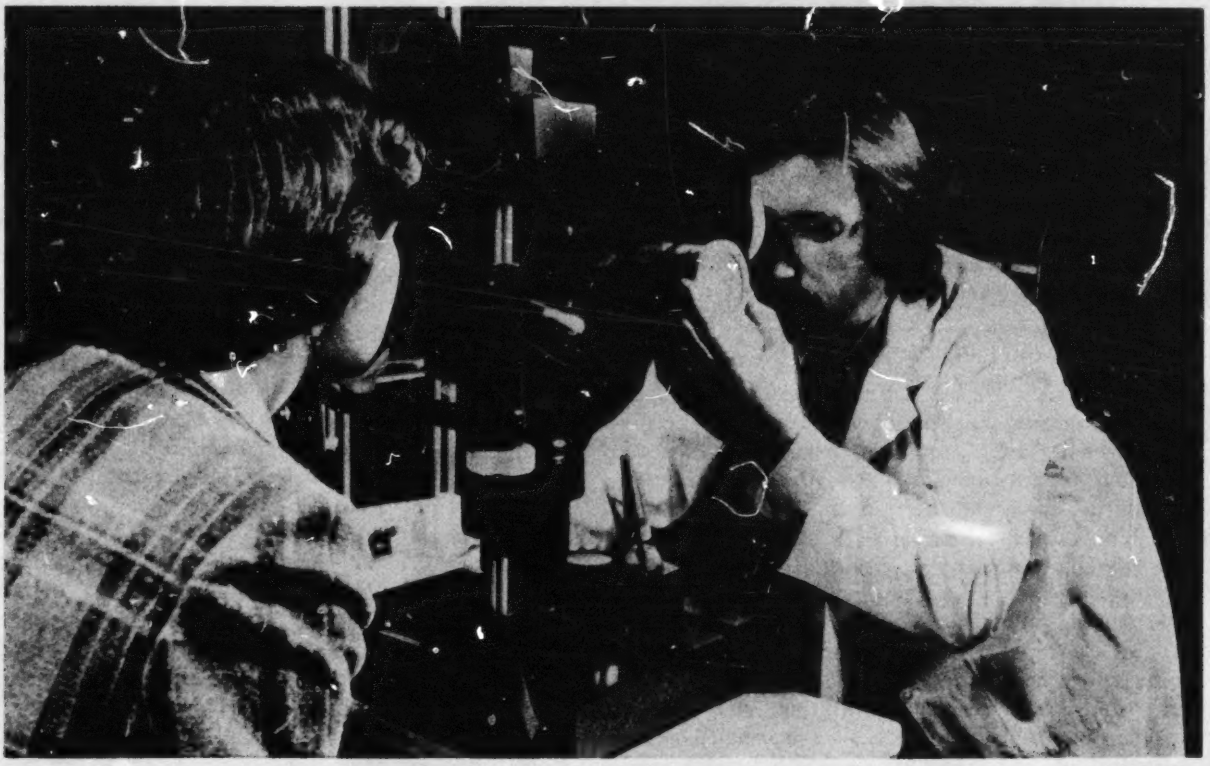
Most dispensing opticians work in retail establishments or have their own shops. Many also work for ophthalmologists or optometrists who sell glasses directly to patients. Some work in eye clinics and hospitals, and others teach in schools of ophthalmic dispensing. Working conditions are generally pleasant, and while the work is not strenuous, certain aspects of it require considerable amounts of standing and walking.

### Job Requirements

Since opticians must do precise and accurate handwork in any of several jobs, manual dexterity is very important. Other qualifications include an aptitute for mathematics, patience, the ability to follow blueprints or sketches, and skill in the use of tools and instruments. Since this work involves substantial public contact, candidates should have tact and enjoy working closely with others.

Many dispensing opticians are trained in apprentice programs. An applicant for apprenticeship must have a high school education or its equivalent and be at least 17 years old. The term of apprenticeship is 3 years (6,000 hours) and includes a minimum of 150 hours per year of related instruction. The first 6 months (1,000 hours) of the program is considered the probationary period. An apprentice whose progress is rapid and who achieves the desired level of competency for a designated period of the apprenticeship may be advanced to the next stage—journeyman—sooner than the required time period.

An alternate method of entering this occupation is through completion of a 1- or 2-year formal program in



ophthalmic dispensing or optical technology in a community college, technical school, or armed forces training facility.

Sixteen schools of opticianry and vocational schools in the United States offer courses in optical technology. Educational and accreditation standards in this field are set by the National Academy of Opticianry. Nineteen States have licensing laws governing the practice of opticianry. Seventeen states require the dispensing optician to be licensed, while in two others, California and Hawaii, the owners or managers of opticianry establishments must meet licensing standards. To qualify for a license, candidates must meet specified standards of education and training and have successfully completed a written, oral, and practical examination. For specific information, the candidate should contact the appropriate State licensing agency.

The National Committee of Contact Lens Examiners offers a program of certification for opticians working as contact lens technicians, and the National Academy of Opticianry offers a program of certification for eligible ophthalmic dispensers to become certified or master opticians. Eligibility for the certification examination may be achieved by graduation from a Board-accredited school of opticianry and either 5 years' preceptorship or licensure in a State.

## Opportunities

Employment opportunities are very good throughout the country. The need for dispensing opticians should continue to increase with the expanding population and a greater public awareness of the importance of regular eye care and examination services. In addition, the variety of eyeglass shapes, styles, and colors available today may influence people to purchase more than a single pair.

A beginner in the field of opticianry may start out as an apprentice technician to learn the technical work of lens grinding and fitting, and in States where opticians are licensed, this knowledge is needed in order to pass the examinations. Students who attend an accredited opticianry school get such shop experience in their regular courses. The trained worker may choose to become a dispenser or can go into business as an independent dispensing optician. As in other retail stores, success depends on business ability, the ability to deal effectively with the public, and experience and skill in the field.

DOT Code: Dispensing Optician 713.361-014
Dispensing Optician 299.474-010

For further information, contact:
Guild of Prescription
Opticians of America, Inc.
1250 Connecticut Avenue, N.W.
Washington, DC 20036

# Ophthalmic Medical Assistant

**Ophthalmic assistant**
**Ophthalmic technician**

Ophthalmic medical assistants are members of health teams which furnish important support services to physicians (ophthalmologists) who treat eye diseases and injuries. Under the direction and supervision of the physicians, they perform a variety of assigned tasks.

Ophthalmic assistants take medical histories; administer diagnostic tests using precision instruments; make anatomical and functional ocular measurements; and test eye functions including visual acuity, visual fields, and sensorimotor functions. Assistants often carry out very technical measuring and testing procedures and, in some cases, even provide technical assistance to the ophthalmologist in ophthalmic surgery. They change eye dressings, administer eye drops or oral medications, and instruct patients in inserting, removing, and caring for contact lenses. They sometimes help the ophthalmologist in fitting the patient for contact lenses, or, with conventional eyeglasses, they may fit, make minor repairs, or adjust the eyeglasses. Other duties include caring for and maintaining optical and surgical instruments and sterilizing surgical instruments.

Ophthalmic medical assistants are often given job titles which reflect their skill level and educational background. Ophthalmic Assistant-A, for example, refers to an individual who is trained to perform the entire range of tasks required to provide continuous assistance to the physician. The training and skills needed to perform at this level can be developed over a period of about 1 year. Ophthalmic technicians, however, are qualified to perform the same tasks as the Ophthalmic Assistant-A but in greater detail, plus additional tasks of greater complexity. The training and skills needed to perform at this level can be secured in approximately a 2-year period. Ophthalmic Assistant-B refers to an individual who is qualified to perform only a limited number of ophthalmic tasks, which are designated by the physician. Regardless of their skill levels, ophthalmic medical assistants do not function as independent practitioners.

Ophthalmic medical assistants are employed in physicians' offices, clinics, hospitals, medical centers, and university research-and-training centers. Working conditions are generally the same as those in a physician's office. There are no unusual physical demands in this occupation; however, it is important that assistants have good vision and manual and finger dexterity. In addition, assistants should like to work with people and possess good communication skills.

## Job Requirements

The Joint Commission on Allied Health Personnel in Ophthalmology collaborates with the Council on Medical Education of the American Medical Association in accrediting training programs for ophthalmic medical assistants. Candidates for admission to accredited programs for ophthalmic medical assistants must be high school graduates or have passed a standard equivalency test or college entrance examination. There are a number of accredited training programs which offer an associate degree and which, over a 2-year period, combine clinical and academic work. One-year programs in which the graduate receives a certificate and is qualified to perform less complex tasks as an assistant are also available. Training programs in this career are offered by medical schools, universities, hospitals, and the military services. Training may also be obtained by a combination of supervised on-the-job experience and home study courses recognized by the Joint Commission.

Generally, the course content of these programs includes general and ocular anatomy and physiology, medical terminology, law and ethics, ophthalmic optics, eye movement, contact lenses, introduction to diseases of the eye, and ophthalmic surgery. Students must also undergo supervised clinical experience during which they have opportunities to apply theory to practice through correlated and supervised instruction in clinical practice.

Although it is not required, ophthalmic medical assistants are encouraged to obtain national certification. Certification and continuing education courses are provided by the Joint Commission on Allied Health Personnel in Ophthalmology. Certification means a formal documention of competence and may improve the assistant's chances of finding of employment in a desired location. In order to qualify, the ophthalmic medical assistant must be sponsored by an

ophthalmologist, have attained defined levels of training and experience, and have successfully completed a national examination.

### Opportunities

There is a continuing demand for qualified assistants to aid ophthalmologists in providing complete eye-care services. Chances for advancement in this work are generally good, and, through clinical experience and continuing education, ophthalmic medical assistants can qualify for high level positions.

DOT Code: Ophthalmic Medical Assistant 079.364-018

For further information, contact:
Joint Commission on Allied Health Personnel in Ophthalmology
1575 University Avenue, St. Paul, Minn. 55104

## Optical Laboratory Technician

**Ophthalmic laboratory technician**
**Optical mechanic**

Optical laboratory technicians grind and polish lenses to the specifications prescribed by ophthalmologists and optometrists and assemble completed lenses in eyeglass frames. Following the lens and frame specifications in the prescription, these technicians select the proper lens blanks for the job, and, using lens-measuring devices, they mark the lens blanks according to specifications. They then set up and operate various machines which cut, grind, and polish the lenses. Next they measure the lenses with precision instruments to insure that the prescribed specifications have been met. At this point, the technicians use grinders to remove excess materials from lenses and shape, smooth, and bevel the edges. They then assemble the lenses and frame parts into finished glasses. Finally, they use precision instruments to detect imperfections in the completed product and to make certain that standards of quality have been met. The exact duties of these technicians vary according to the size of the establishment in which they work. In large laboratories, for example, technicians usually specialize in one phase of this work, while in small establishments technicians perform all or most of the operations.

Most optical laboratory technicians work in laboratories. But many are also employed in retail operations where prescription lenses are sold, for ophthalmologists (eye physicians) and for optometrists who dispense glasses directly to patients. Most technicians work standard hours in work surroundings which are well-lighted and ventilated. However, working conditions are noisy because of the various machines used to process lenses.

### Job Requirements

The basic educational requirement for this work is graduation from high school or the equivalent. Courses in physics, algebra, geometry, and mechanical drawing are desirable, in addition to an interest in and the talent for work that requires close attention to detail. Training in this field can be obtained on the job, in vocational or technical schools, or through formal apprenticeship programs.

In on-the-job training programs the trainees are taught basic skills, starting with the most simple, and, as experience is gained, reaching the highest skill level. Generally this type of program involves about 3 years of training to develop all-around mechanical skills, but trainees who specialize in one area of this work require less training time.

Formal apprenticeship programs in this work are generally from 3 to 4 years in length. These programs provide extensive training curriculums, and graduates are highly regarded by employers in this field. Generally, persons completing apprenticeship programs have greater job and advancement prospects than others in this field.

Some vocational or technical schools offer full-time programs in this work, lasting from 9 to 12 months. Graduates of such programs do not qualify as full mechanics and must add to their learning through further training, usually in an on-the-job situation.

Licensing requirements for optical laboratory technicians vary throughout the country. In those States where licensing is required, technicians must meet specified standards of education, training, and experience and pass a qualifying examination. State licensing agencies should be contacted to determine the legal requirements.

### Opportunities

Employment prospects for qualified optical laboratory technicians are excellent. This is based on population increases coupled with the growing public awareness of the importance of regular eye-care services.

Advancement in this field is based on skill level and experience in all aspects of this work. Many technicians

become supervisors or move into higher level managerial work. Others, through further training and education, become dispensing opticians, and some go into business for themselves.

| DOT Code: | | |
|---|---|---|
| | Lay-Out Technician | 716.381-014 |
| | Precision-Lens Grinder | 716.382-018 |
| | Eyeglass-Lens Cutter | 716.682-010 |
| | Precision-Lens Polisher | 716.682-018 |

For further information, contact:
National Academy of Opticianry
Opticians Association of America

## Optometric Technician and Optometric Assistant

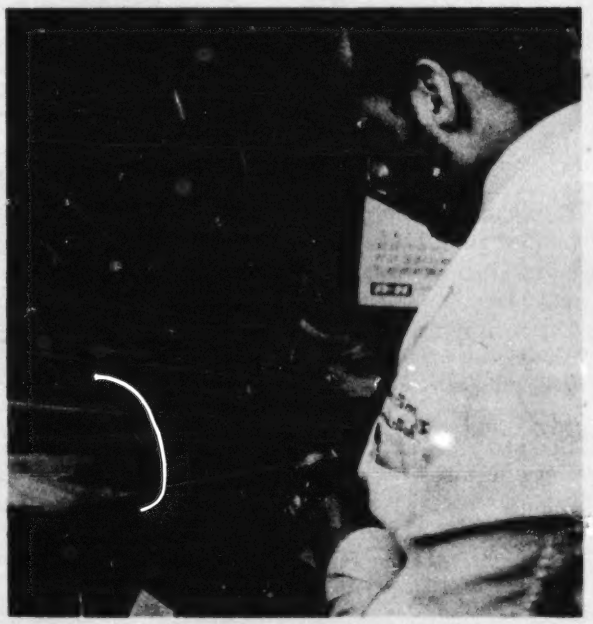
As a profession, optometry deals with many of the problems of human vision, and today many optometrists use paraprofessionals to assist with patient services. Two such paraprofessionals are the optometric technician and the optometric assistant.

Optometric technicians are para-optometric personnel who assist the optometrist with vision-care services. Generally, their duties are complex in nature. They measure the curvature (or power) of the cornea; test the ability of the patient to see numbers or letters of a specific size at a specified distance; and record pressures or tensions within the eye. They determine the power of lenses in old and new prescriptions, assist the patient in frame selection, and take facial and frame measurment. One of the most valuable services rendered by optometric technicians is the building of a patient-technician relationship. They inform the patient of what is involved in examination procedures or special tests, to eliminate unnecessary fears and build the patient's confidence in the treatment. They may also perform ophthalmic laboratory work, modify conventional glasses or contact lenses, keep an inventory of optometric materials, and clean and care for instruments. Other duties may include bookkeeping, secretarial, and office-management responsibilities. In all cases, their duties are performed under the supervision and guidance of an optometrist.

Optometric assistants perform a variety of tasks which are generally less complex than those of the optometric technician. They keep records, act as receptionists, assist patients with frame selection, and order prescribed lenses. They may do visual-acuity testing, color-vision screening, as well as visual-field testing. In addition, assistants may also provide patients with instructions on the use and care of different types of lenses.

While many of the duties of optometric technicians and optometric assistants are similar, the primary difference between the two lies in educational preparation. Technicians have more extensive formal training and, as a result, are better prepared to handle more complex duties. (Education and training are discussed under Job Requirements in the following pages). However, the specific duties of technicians and assistants are determined by the employing optometrists. In certain cases, technicians are relegated to performing simple tasks, with little patient contact, while some assistants are assigned tasks normally associated with the technician job. The general trend, however, is to assign the complex tasks to technicians who have a broader educational background. In large optometric practices, these paraprofessionals may specialize in any of the following functions: laboratory, contact lens, visual training, chairside assistance, or office administration. Those in smaller practices may assume all of these duties.

Most optometric technicians and assistants work for optometrists engaged in private practices of varying sizes. Others are employed in clinics, government agencies, optical-instrument manufacturers, health-maintenance organizations, and various branches of the armed forces. Generally, technicians and assistants have a standard workweek, and although the physical demands of the job are light, considerable standing is often required.



## Job Requirements

Preparation for a career as an optometric technician includes completion of high school or the equivalent, plus the ability to pass a college entrance examination for enrollment in a 2-year college program leading to an Associate of Applied Science degree. Educational programs vary with the institution. One variation is a two-phase program in which the first year of general college work is taken at any accredited institution, while the second year is administered in cooperation with or by a college of optometry. Another type of program combines general college course work and technicians' training over a 2-year period. In both instances, lectures and laboratory work are supplemented by actual experience in optometric clinics. The following basic areas are covered in most courses of study: anatomy and physiology of the eye, ophthalmic optics, visual training/orthoptics, clinical practice/ethics and professional roles, contact-lens theory and practice, and office management. Programs for optometric technicians are available in community, technical, and junior colleges, as well as colleges of optometry.

Optometric assistants, for the most part, develop their skills through on-the-job training by their employers. However, training can also be acquired in 1-year training courses in optometric assisting. Requirements for on-the-job training or formal training programs include completion of high school or its equivalent, normal vision, a neat appearance, and tactfulness in dealing with patients.

There are no licensing or certification requirements for optometric technicians or optometric assistants at this time. However, the American Optometric Association sponsors the National Registry for Paraoptometric Personnel, which recognizes assistants and technicians who meet certain minimum standards.

## Opportunities

Employment prospects for trained optometric technicians and optometric assistants are quite favorable. This outlook is based on population growth, greater demands for eye-care services, and the increasing interest of practitioners in employing technically competent technicians and assistants. Advancement in this work is attained through work experience and continued education in this specialty.

DOT Code: Optometric Assistant 079.364-014

For further information, contact:
American Optometric Association

# Optometrist

Optometrists, doctors of optometry (OD), are educated and clinically trained to examine, diagnose, and treat conditions of the vision system. As a primary point of entry into the health-care system, they are also trained to recognize symptoms of eye diseases and general health problems that require referral to other health care professionals.

Optometrists perform a variety of objective and subjective test procedures to diagnose vision conditions and to detect symptoms of eye disease and general health problems. They provide treatment by prescribing corrective lenses, contact lenses, and special optical aids and by providing vision therapy to preserve or restore maximum efficiency of vision.

Optometrists may provide all of these services or they may specialize in a particular area of optometric care. For example, due to the ever-increasing use of contact lenses, some optometrists devote their entire attention to prescribing and fitting contact lenses. Through optometric research, telescopic and microscopic lens systems have been improved to benefit many people of all ages with low or limited vision. These sophisticated low vision aids, which have proven especially beneficial to the elderly, constitute another area of optometric specialization. Yet another area is vision therapy, which has long been recognized as an effective means of treating conditions such as crossed-eyes (strabismus) and lazy eye (amblyopis) and of improving many important visual/perceptual skills.

In addition to these areas, some optometrists chose to limit their practices by age group, for example, children or the elderly.

The majority of optometrists are self-employed and in single (solo) practice. Others work in group medical practices, hospitals, public health agencies, research institutions, manufacturing organizations and various government agencies. Optometrists also serve in all branches of the military, teach in colleges and universities, and take part in optical and vision research projects.

Optometrists act as consultants to schools, nursing homes, government agencies, private industry and institutions, where they use their knowledge to treat vision problems. Many optometrists, through the American Optometric Association, the National Optometric Association, the State optometric associations and other national and local community and service organizations, are active in consumer health education programs.

## Job Requirements

Educational preparation for a career in optometry involves a minimum of 6 years classroom study and clinical training beyond completion of high school. Students should begin early by taking undergraduate courses in the fundamental sciences—mathematics, chemistry, physics, biology, physiology, anatomy, and psychology.

All schools and colleges of optometry require at least 2 years of college or junior college work prior to admission to optometry school. But, today, many beginning optometry students complete a 4-year college course of study before entering their professional training. The optometry school course of study and training, leading to the OD degree, requires at least 4 years.

There are 12 American schools and colleges and one Canadian college of optometry accredited by the American Optometric Association Council on Optometric Education. A 13th American college is in the process of seeking accreditation.

All States and the District of Columbia require optometrists to be licensed. An applicant for licensure must have a Doctor of Optometry degree from an accredited school or college of optometry and pass a State board examination in the State in which practice is planned. In some States, applicants may substitute the National Board of Optometry examination, given in the third and fourth years of optometry school, for part or all of the written State examination.

In the event of later relocation to another State, an optometrist may be licensed in the adopted State by reciprocal agreement. Most States extend this privilege to optometrists from other States if they have been in practice for several years. Some States may require reexamination.

## Opportunities

There is a definite need for optometrists throughout the United States. The increased demand for vision care has resulted not only from population growth and in-

creased affluence, but from a greater awareness of how good vision relates to driving, industrial productivity, student achievement, adjustment to aging, and other crucial areas of modern society, as well as growing inclusion of vision care in third party health insurance programs.

The schools and colleges of optometry are currently able to graduate barely enough optometrists to take the place of those who die or retire, but by 1990, an estimated 27,000 additional optometrists will be needed to reach a satisfactory ratio of doctors of optometry to the public.

Optometrists often enter the profession as associates of practicing optometrists to gain experience and then establish independent practices. As private practitioners, their success depends on experience, ability, and skills.

There are many opportunities for new graduates to associate themselves with established optometrists who need assistance or are preparing for retirement. The American Optometric Association and the National Optometric Association serve as clearinghouses for associate opportunities and provide placement services to their members. Generally, there are more openings than interested graduates.

Optometrists who specialize in such areas as health education, public health administration, physiological optics, or health information and communications can advance by completing advanced studies leading to a master's or doctorate degree. Those optometrists who chose careers in the armed forces can advance in rank through the traditional methods of promotion.

DOT Code: Optometrist 079.101-018

For further information, contact:
American Optometric Association
National Optometric Association (Professional organization of minority optometrists)

## Orthoptist

Orthoptists are specialists who diagnose and treat eye-muscle and fused-vision disorders. Under the supervision of ophthalmologists, orthoptists work with children and adults who need training in coordinating the use of both eyes. Their patients include those who are physically uncomfortable because of the strain and fatigue arising from the effort involved with using both eyes together and those who are psychologically uncomfortable because of obviously crossed eyes. Orthoptics literally means straight eyes, but orthoptists do not try to "uncross eyes." Instead, they teach their patients special exercises which help misaligned eyes to work together and to see together with properly fused vision.

Orthoptists are very much like teachers, and, since much of their work is done with children, these specialists need patience and understanding to secure the confidence and cooperation of children and their parents. Orthoptists are clinically trained to help diagnose defects in eye coordination and also to assist the ophthalmologist in performing other professional tasks, such as visual-field and glaucoma testing. Some specialists also teach or do research in the field of orthoptics to devise new techniques and theories to benefit those in need. Most orthoptists work for one or more ophthalmologists in private offices, clinics, hospitals, or medical schools.

### Job Requirements

Individuals considering this career must be at least 20 years old and have a minimum of 2 years of college or RN training. Skills training in orthoptics is available in accredited training centers or preceptorship programs and lasts a period of 24 months in either case. Training centers provide both practical and theoretical training at the same time. Preceptor programs are conducted in offices or eye clinics and include an 8-week basic course in orthoptics and eye-examination techniques sponsored by the American Orthoptic Council.

A certificate of proficiency is issued by the American Orthoptic Council to qualified students who pass an examination given by the council. There is no legal requirement to obtain such certification, but more than 95 percent of all medically trained orthoptists are certified.

### Opportunities

The employment outlook for orthoptists is excellent. Positions are avialable in all parts of the country and the number of available openings far exceeds the supply of trained specialists. At present, there are only a limited number of accredited training programs available, with the result that less than 50 persons are fully trained each year to enter this career.

DOT Code: Orthoptist 079.371-014

For further information, contact:
The American Orthoptic Council

# Salary Chart*

This chart provides a general picture of the salaries for a representative group of health occupations in the *Guidebook*.

The information in the chart is based upon the University of Texas Medical Branch 1978 National Survey of Hospital and Medical School Salaries (includes medical centers). These are monthly salaries based on a regular 40-hour week and exclusive of fringe benefits.

| Occupation | Starting Rate Range | Maximum Rate Range |
|---|---|---|
| Audiologist | $836-$1,898 | $1,038-$2,819 |
| Certified Laboratory Assistant | $506-$1,095 | $607-$1,505 |
| Cytology Technician | $680-$1,270 | $798-$1,650 |
| Dialysis Technician | $537-$1,305 | $671-$1,578 |
| Dietitian | $818-$1,783 | $960-$2,473 |
| EEG Technician | $555-$1,361 | $610-$1,880 |
| EKG Technician | $503-$987 | $570-$1,259 |
| Head Nurse | $922-$1,783 | $1,111-$2,473 |
| Histology Technician | $566-$1,452 | $727-$1,648 |
| Licensed Vocational Nurse | $563-$1,095 | $667-$1,505 |
| Medical Illustrator | $635-$1,500 | $727-$1,798 |
| Medical Laboratory Technician | $566-$1,505 | $663-$1,880 |
| Medical Librarian | $842-$1,617 | $917-$1,967 |
| Medical Photographer | $592-$1,555 | $692-$1,714 |
| Medical Record Administrator | $672-$2,242 | $861-$3,114 |
| Medical Technologist | $700-$1,505 | $823-$1,880 |
| Nuclear Medicine Technologist | $756-$1,489 | $820-$2,060 |
| Nurse Anesthetist | $1,080-$1,907 | $1,294-$2,420 |
| Occupational Therapist | $622-$1,459 | $865-$1,840 |
| Operating Room Technician | $505-$1,141 | $594-$1,505 |
| Ophthalmic Assistant | $511-$1,24[illegible] | $600-$1,650 |
| Pharmacist | $945-$1,965 | $1,176-$2,473 |
| Physical Therapist | $822-$1,627 | $939-$2,255 |
| Physician's Assistant | $974-$1,475 | $974-$2,072 |
| Radiologic Technologist | $575-$1,306 | $735-$1,804 |
| Recreational Therapist | $577-$1,340 | $709-$1,840 |
| Respiartory Therapist | $690-$1,361 | $830-$1,880 |
| Social Worker | $836-$1,783 | $981-$2,473 |
| Speech Pathologist | $879-$1,898 | $1,042-$2,819 |

* Specific salaries are influenced by many factors, including the education, training, and experience of the worker, the geographic location of the occupation, the size of the institution in which the occupation is found, and whether or not the occupation is one which occurs in private practice.

# Where To Get More Information

The following are the addresses of the organizations listed in the career briefs. Additional references that may be helpful have been included.

Alliance for Engineering in Medicine and Biology
4405 East West Highway, Suite 404
Bethesda, Maryland 20014

American Academy of Family Physicians *
1740 West 92nd Street
Kansas City, Missouri 64114

American Academy of Health Administration *
P.O. Box 5518, I-30 at Summerhill Rd.
Texarkana, Texas 75503

American Academy of Pediatrics
1801 Hinman Avenue
Evanston, Illinois 60204

American Academy of Physicians' Assistants *
2341 Jefferson Davis Highway
Suite 700
Arlington, Virginia 22202

American Art Therapy Association
c/o Intermanagement
One Cedar Blvd.
Pittsburgh, Pennsylvania 15228

American Association for Clinical Chemistry *
1725 K Street, N.W., Suite 1402
Washington, D.C. 20006

American Association for Laboratory Animal Sciences
2317 W. Jefferson Street, Suite 208
Joliet, Illinois 60435

American Association for Music Therapy
Education Bldg., 35 West 4th St.
New York, New York 10003

American Association for Rehabilitation Therapy
Box 93
North Little Rock, Arkansas 72116

American Association for Respiratory Therapy *
1720 Regal Row
Dallas, Texas 75235

American Association of Anatomists
Department of Anatomy
University of Arkansas Medical Center
4301 W. Markham St.
Little Rock, Arkansas 72204

American Association of Blood Banks
1828 L Street, N.W. Suite 608
Washington, D.C. 20036

American Association of College of Osteopathic Medicine
4720 Montgomery Lane
Suite 609
Bethesda, Maryland 20014

American Association of Colleges of Pharmacy
4630 Montgomery Avenue, Suite 201
Bethesda, Maryland 20014

American Association of Dental Schools *
1625 Massachusetts Avenue, N.W.
Washington D.C. 20036

American Association of Medical Assistants *
1 E. Wacker Drive, Suite 1510
Chicago, Illinois 60601

American Association of Nephrology Nurses and Technicians
2 Talcott Rd., Suite 8.
Park Ridge, Illinois 60068

American Association of Nurse Anesthetists *
111 E. Wacker Drive, Suite 929
Chicago, Illinois 60601

American Association of Occupational Health Nurses
79 Madison Avenue
New York, New York 10016

American Association of Ophthalmology
1100 17th Street, N.W.
Washington, D.C. 20036

American Association of Orthodontists
7477 Delmar Blvd.
St. Louis, Missouri 63130

American Association of Physicists in Medicine
111 East Wacker Drive
Chicago, Illinois 60601

American Cardiology Technologists Association
Box 3425
Temple, Texas 76501

American Chiropractic Association *
2200 Grand Avenue
Des Moines, Iowa 50312

American College of Hospital Administrators *
840 N. Lake Shore Drive
Chicago, Illinois 60611

American College of Nurse-Midwives
1000 Vermont Ave., N.W. Suite 1210
Washington, D.C. 20005

American College of Nursing Home Administrators
4650 East-West Highway
Washington, D.C. 20014

American College of Obstetricians and Gynecologists *
1 East Wacker Drive
Chicago, Illinois 60601

American College of Radiology
20 North Wacker Drive, Suite 2920,
Chicago, Illinois 60606

American College of Surgeons *
55 East Erie Street
Chicago, Illinois 60611

American Corrective Therapy Association *
Rte. 2, Box 192A
Jonesboro, Tennessee 37659

American Dance Therapy Association
2000 Century, Plaza, Suite 230
Columbia, Maryland 21044

American Dental Assistants Association *
211 E. Chicago Ave., Suite 1230
Chicago, Illinois 60611

American Dental Association *
211 E. Chicago Ave.
Chicago, Illinois 60611

American Dental Hygienists' Association *
211 E. Chicago Ave., Suite 1616
Chicago, Illinois 60611

American Dietetic Association *
430 N. Michigan Ave.
Chicago, Illinois 60611

American Foundation for the Blind *
15 W. 16th St.
New York, New York 10011

American Genetic Association
1028 Connecticut Avenue, N.W.
Washington, D.C. 20036

American Home Economics Association
2010 Massachusetts Ave., N.W. *
Washington, D.C. 20036

American Industrial Hygiene Association
66 S. Miller Rd.
Akron, Ohio 44313

American Institute of Biological Sciences
1401 Wilson Blvd.
Arlington, Virginia 22209

American Medical Association •
Dept. of Health Manpower
535 N. Dearborn St.
Chicago, Illinois 60610

American Medical Record Association •
875 N. Michigan Ave., Suite 1850
Chicago, Illinois 60611

American Medical Technologists •
710 Higgins Rd.
Park Ridge, Illinois 60068

American Medical Writers' Association
5272 River Rd., Suite 290
Bethesda, Maryland 20014

American Occupational Therapy Association •
6000 Executive Building
Rockville, Maryland 20852

American Optometric Association •
243 North Lindbergh Blvd.
St. Louis, Missouri 63141

American Orthoptic Council
555 University Ave.
Toronto, Ontario M5G, 1X8, Canada

American Orthotic and Prosthetic Association
1444 N St. N.W.
Washington, D.C. 20005

American Osteopathic Association •
212 E. Ohio St.
Chicago, Illinois 60611

American Physical Therapy Association •
1156 15th St., N.W., Suite 500
Washington, D.C. 20005

American Podiatry Association
20 Chevy Chase Circle, N.W.
Washington, D.C. 20015

American Psychiatric Association •
1700 18th St., N.W.
Washington, D.C. 20009

American Psychological Association •
1200 17th St., N.W.
Washington, D.C. 20036

American School Health Association
Box 708
Kent, Ohio 44240

American Society for Medical Technology •
5555 W. Loop South, Suite 200,
Bellaire, Texas 77401

American Society for Pharmacology and Experimental Therapeutics
9650 Rockville Pike
Bethesda, Maryland 20014

American Society for Microbiology •
1913 I St. N.W.
Washington, D.C. 20006

American Society of Allied Health Professions
One Dupont Circle, N.W. Suite 300
Washington, D.C. 20036

American Society of Clinical Pathologists
Board of Registry
P.O. Box 4872
Chicago, Illinois 60612

American Society of Cytology •
Health Sciences Center
Jefferson University
130 S. 9th St., Suite 1006
Philadelphia, Pennsylvania 19107

American Society of Electroencephalographic Technologists
2997 Moon Lake Dr.
West Bloomfield, Michigan 48033

American Society of Extracorporeal Technology
Reston International Center
11800 Sunrise Valley Drive
Reston, Virginia 22091

American Society of Radiologic Technologists
500 N. Michigan Ave., Suite 836
Chicago, Illinois 60611

American Society of Ultrasound Technical Specialists
Box 1976, University of Kansas Medical Center
Kansas City, Kansas 64103

American Speech and Hearing Association •
10801 Rockville Pike
Rockville, Maryland 20852

American Statistical Association
806 15th St., N.W., Suite 640
Washington, D.C. 20005

American Veterinary Medical Association
930 N. Meacham Rd.
Schaumberg, Illinois 60196

Association for the Advancement of Health Education
1201 16th St., N.W.
Washington, D.C. 20036

Association for the Advancement of Medical Instrumentation
1901 N. Fort Myers Drive, Suite 602
Arlington, Virginia 22209

Association of Medical Colleges •
One Dupont Circle, N.W.
Washington, D.C. 20036

Association of Medical Illustrators
6650 Northwest Highway
Chicago, Illinois 60631

Association of Medical Rehabilitation Directors & Coordinators
3830 Linklea Dr., Houston, Texas 77025

Association of Operating Room Nurses
10170 E. Mississippi Ave.
Denver, Colorado 80231

Association of Operating Room Technicians
1100 W. Littleton Blvd., Suite 201
Littleton, Colorado 80120

Association of Schools of Public Health
1825 N St. N.W., Suite 707
Washington, D.C. 20006

Association of University Programs in Health Administration •
One Dupont Circle, Suite 420
Washington, D.C. 20036

Biological Photographic Association •
6650 Northwest Highway
Chicago, Illinois 60631

Biomedical Engineering Society
P.O. Box 2399
Culver City, California 90230

Contact Lens Society of the United States
301 First National Building
Lexington, Kentucky 40507

Council on Social Work Education
345 E. 46th St.
New York, New York 10017

Environmental Management Association
1701 Drew St.
Clearwater, Florida 33515

Environmental Protection Agency
Personnel Management Division
PM 212
401 M Street, S.W.
Washington, D.C. 20460

Health Sciences Communications Association
P.O. Box 79
Millbrae, California 94030

Hospital Financial Management Association
666 N. Lake Shore Dr., Suite 245
Chicago, Illinois 60611

Institute of Food Technologists *
221 N. LaSalle St.
Chicago, Illinois 60641

Joint Commission on Allied Health Personnel in Opthalmology
1575 University Ave.
St. Paul, Minnesota 55104

Maternity Center Association *
48 E. 92 St.
New York, New York 10028

Medical Library Association *
919 North Michigan Ave., Suite 3208
Chicago, Illinois 60611

National Academy of Opticianry
514 Chestnut Street
Big Rapids, Michigan 49307

National Association for Hearing and Speech Action
814 Thayer Ave.
Silver Spring, Maryland 20910

National Association for Mental Health
1800 N. Kent St.
Arlington, Virginia 22209

National Association for Music Therapy *
Box 610
Lawrence, Kansas 66044

National Association for Practical Nurse Education and Service *
122 E. 42nd St.
New York, New York 10017

National Association of Dental Laboratories *
3801 Mount Vernon Ave.
Alexandria, Virginia 22305

National Association of Human Services Technologists
1127 11th St., Main Floor
Sacramento, California 95814

National Association of Science Writers
Box H
Sea Cliff, New York 11579

National Association of Social Workers *
1425 H St., N.W., Suite 600
Washington, D.C. 20005

National Athletic Trainers Association
P.O. Box 1865
Greenville, North Carolina 27834

National Council for Homemaker-Home Health Aide Services
67 Irving Place
New York, New York 10003

National Council for Therapy and Rehabilitation Through Horticulture
Mt. Vernon, New York 22121

National Dental Association *
734 15th Street, N.W.
Washington, D.C. 20005

National Easter Seal Society for Crippled Children and Adults
2023 W. Odgen Avenue
Chicago, Illinois 60612

National Environmental Health Association
1200 Lincoln Street Room 704
Denver, Colorado 80203

National Federation of Licensed Practical Nurses *
888 Seventh Avenue
New York, New York 10019

National Health Council
1740 Broadway
New York, New York 10019

National League for Nursing *
10 Columbus Circle
New York, New York 10019

National Male Nurse Association *
2309 State St.
Saginaw, Michigan 48602

National Medical Association *
1720 Massachusetts Avenue, N.W.
Washington, D.C. 20036

National Optometric Association *
P.O. Box 54425
Atlanta, Georgia 30308

National Podiatry Association *
Crenshaw Medical Arts Center
Suite 302
3756 Santa Rosalia Drive
Los Angeles, California 90008

National Registry of Emergency Medical Technicians
P.O. Box 29233
1395 East Dublin-Granville Road
Columbus, Ohio 43229

National Rehabilitation Counselling Association *
1522 K St., N.W., Suite 1110
Washington, D.C. 20005

National Secretaries Association
616 East 63rd Street
Kansas City, Missouri 64110

National Society for Cardiopulmonary Technology
3535 University Blvd., W. Suite 23
Kensington, Maryland 20795

National Student Nurses Association
10 Columbus Circle, Room 2330
New York, New York 10019

National Therapeutic Recreation Society *
1601 N. Kent St.
Arlington, Virginia 22209

Opticians Association of America
1250 Connecticut Ave., N.W.
Washington, D.C. 20036

Society for Public Health Educators
693 Sutter St.
San Francisco, California 94102

Society for Technical Communication
1010 Vermont Avenue, N.W. Suite 421
Washington, D.C. 20005

Society of Nuclear Medicine
475 Park Ave., S.
New York, New York 10016

Technical Education Research Center
44 Brattle St.
Cambridge, Massachusetts 02138

* These organizations sponsor financial aid programs or have financial aid information available.

**The following organizations can usually supply you with information about health care opportunities or training programs within their particular city or state.**

Health Careers Council of Alabama
500 North East Blvd.
Montgomery, Alabama 36109

Arizona Hospital Association
4202 East Raymond St.
Phoenix, Arizona 85040

Hospital Council of Southern California
6255 Sunset Blvd.
Los Angeles, California 90028

Health Careers Council
1601 East 19 Ave.
Denver, Colorado 80218

Bureau of Health Planning and Resources Development
Jesse S. Cooper Building
Dover, Delaware 19901

Hospital Council of the National Capitol Area
2021 K St., N.W., Suite 300
Washington, D.C. 20006

Florida Hospital Association
P.O. Box 6905, 315 Park Lake Circle
Orlando, Florida 32803

Georgia State Scholarship Commission
9 La Vista Perimeter Park, Suite 110
2187 Northlake Parkway
Tucker, Georgia 30084

Idaho Hospital Association
P.O. Box 7482
Boise, Idaho 83707

Illinois Hospital Association
1200 Jorie Blvd.
Oak Brook, Illinois 60521

Indiana Health Careers, Inc.
2905 North Meridian
Indianapolis, Indiana 46208

Kansas Health Careers Council
c/o Kansas State Dept. of Education
120 E. Tenth St.
Topeka, Kansas 66612

Maine Hospital Association
151 Capitol St.
Augusta, Maine 04330

Maryland Hospital Association
1301 York Road
Lutherville, Maryland 21093

Massachusetts Hospital Association
5 New England Executive Park
Burlington, Massachusetts 01803

Michigan Health Council
1407 S. Harrison Rd., P.O. Box 1010
East Lansing, Michigan 48823

Mississippi Hospital Association
P.O. Box 16444
Jackson, Mississippi 39206

Missouri Hospital Association
P.O. Box 1044, 1233 Jefferson St.
Jefferson City, Missouri 65101

Montana Hospital Association
P.O. Box 5119
Helena, Montana 59601

Bureau of Community Health Services
State Health Department
P.O. Box 95007
Lincoln, Nebraska 68509

New Hamshire Health Careers Council
61 South Spring St.
Concord, New Hampshire 03301

New Jersey Hospital Association
Research Park, 1101 State Rd.
Princeton, New Jersey 08540

New Mexico Hospital Association
3010 Monte Vista, N.E., Suite 208
Albuquerque, New Mexico 87106

Veterans Health Manpower Center
New York State Department of Health
Tower Bldg., Empire State Plaza
Rm. 723
Albany, New York 12237

Western New York Hospital Association
2005 Sheridan Drive
Buffalo, New York 14223

North Carolina Hospital Association
Health Careers Program
P.O. Box 10937
Raleigh, North Carolina 27605

Division of Allied Health Professions
Minot State College
Minot, North Dakota 58701

Health Careers Association of Greater Cincinnati
2400 Reading Rd.
Cincinnati, Ohio 45202

Health Careers of Ohio
P.O. Box 5574
Columbus, Ohio 43221

Oklahoma Council for Health Careers
715 N.E. 15th St.
Oklahoma City, Oklahoma 73104

Oregon Association of Hospitals
220 South West Morrison St.
Portland, Oregon 97204

Hospital Association of Pennsylvania
P.O. Box 608
Camp Hill, Pennsylvania 17011

South Carolina Commission on Higher Education
Rutledge Bldg., 1429 Senate St.
Columbia, South Carolina 29201

Health Manpower Development Program
State Department of Health
Joe Foss Bldg., Rm. 319
Pierre, South Dakota 57501

Health Careers for Tennessee
500 Interstate Blvd. South
Nashville, Tennessee 37211

Health Careers Program
Texas Hospital Association
P.O. Box 15587
Austin, Texas 78761

Utah State Hospital Association
455 East Fourth, South
Salt Lake City, Utah 84111

Virginia Health Careers
Virginia Council on Health and Medical Care
P.O. Box 12367, Central Station
Richmond, Virginia 23241

Washington State Hospital Association Education & Research Foundation
601 Broadway
Seattle, Washington 98122

West Virginia Health Systems Agency Inc.
815 Quarrier St.
Suite 212
Morrison Bldg.
Charleston, West Virginia 25301

Health Careers Program
Wisconsin Health Council, Inc.
P.O. Box 4387
Madison, Wisconsin 53711

Hospital Council of Greater Milwaukee Area
2300 N. Mayfair Rd.
Milwaukee, Wisconsin 53226

Wyoming Hospital Association
2015 Greely Hwy., P.O. Box 3390
Cheyenne, Wyoming 82001

Sources of Financial Aid
and Student Loans

## Selected Financial Aid Programs— General Education

This financial aid chart should be used only as a general guideline. Financial aid programs, the dollars available, and eligibility requirements change annually. Readers are urged to contact the programs directly for the most current information available.

| Program | Financial Aid Available | Eligibility Requirements | More Information/ Applications |
|---|---|---|---|
| **Basic Education Opportunity Grant (BEOG)** | Grants up to a maximum of $1,600 per academic year. | Financial need. Undergraduate student enrolled in an approved post-secondary institution on at least a half-time basis in a program of study which is at least 6 months in length. | Contact your high school guidance office, financial aid office of post-secondary institution or write: BEOG, P.O. Box 84, Washington, D.C., 20044 |
| **Bureau of Indian Affairs (BIA) Higher Education Program** | Amount scholarship varies. Average amount awarded is $1,750 per academic year. | Financial need. Student must be at least one quarter or more American Indian, Eskimo, or Aleut; a member of a tribe, receiving benefits from BIA and enrolled or accepted in 4-year accredited college or university. | Contact the BIA office in your area or write: BIA, Division of Continuing Education, P.O. Box 1788, Albuquerque, N.Mex., 87103 |
| **College Work Study** | Provides financial aid in the form of part-time employment. Jobs limited to 40 hours per week. Hourly wage varies. | Financial need. A student must be enrolled at least half time as an undergraduate, vocational, or graduate student in an approved educational institution. | Contact school financial aid office of office of student employment. |
| **Guaranteed Student Loan** | Undergraduate: Loan to $2,500 per year to total $7,500 maximum; graduate: up to $5,000 per year to a total $15,000 maximum: Loan carries 7% interest, loan subsidization and deferment available. | Enrolled in or accepted as at least a half-time student in eligible college, university, school of nursing, vocational, technical, trade business, or home study school. | Contact the school financial aid office or State offices listed on page 217. |
| **National Direct Student Loan (NDSL)** | Undergraduate: Loan $2,500 maximum if enrolled in vocational program or have completed less than 2 years college toward bachelors degree; $5,000 maximum if student *has completed* 2 years of study toward bachelors degree. Graduate: Loan to $10,000 maximum *including* any amount borrowed under NDSL for undergraduate study; 3% interest rate, 10 years to repay loan. Loan deferment and cancellation provisions available. | Financial need. Must be enrolled at least half time in participating education institution. | Contact financial aid office of school. |

| Program | Financial Aid Available | Eligibility Requirements | More Information/ Applications |
|---|---|---|---|
| **Pickett S. Hatcher Education Fund** | Loans up to $1,500 per year to total $6,000 maximum. 2% interest rate per year during college; 6% per year after college. | Finanacial need. Must be enrolled as a full-time undergraduate in college or university. No assistance available for vocational school or business college. | Write Pickett S. Hatcher Educational Fund, P.O. Box 2128, Columbus, Ga. 31902. |
| **Social Security Administration Program** | Amount varies. | Available to students of deceased, disabled, or retired parents (and in some cases grandparents) who qualify under the Social Security Act. Student must be enrolled, full time, in an accredited educational institution. | Contact Social Security office in your community. |
| **Supplemental Education Opportunity Grant** | $200-1,500 per year. Total $4,000 maximum for 4 years or $5,000 for 5 years' study. | Exceptional financial need. Must be enrolled at least half time as an undergraduate or vocational student in a participating educational institution. | Contact school financial aid office. |
| **United Student Aid Fund** | Undergraduate: Loan up to $2,500 per year to the maximum; Graduate: up to $5,000 per year to $15,000 maximum; 7% interest rate; loan subsidization available. | Must be enrolled in a participating educational institution. | Contact the school Financial Aid Office or write: United Student Aid Funds, 6610 North Shadeland Avenue, P.O. Box 50827, Indianapolis, IN 46250. |
| **Veterans Administration Program** | Loans and grants. Amount varies. | Benefits for veterans and children of veterans who meet specific requirements. Eligibility requirements vary with different programs available. | Contact Veterans Administration. |

## Selected Financial Aid Programs— Health Careers Only

This financial aid chart should be used only as a general guideline. Financial aid programs, the dollars available, and eligibility requirements change annually. Readers are urged to contact the programs directly for the most current information available.

| Program | Financial Aid Available | Eligibility Requirements | More Information/ Applications |
|---|---|---|---|
| **Armed Forces Health Professions Scholarship** | All educational expenses, exclusive of room and board, plus a $400 per month living stipend. | Graduate student in professional schools of medicine, osteopathy, dentistry, optometry, podiatry, veterinary medicine, clinical psychology at Ph.D. level after graduation must serve minimum of 2 years active duty. | Contact local recruiter or write: Armed Forces, Scholarships, Box A University City, Tex. 78148 |

| Program | Financial Aid Available | Eligibility Requirements | More Information/ Applications |
|---|---|---|---|
| **Federal Insurance Student Loan for Health Professions** | Loans up to $10,000 per year to total $50,000 maximum (up to $7,000 per year to $37,500 for pharmacy students). Loan deferment available. | Graduate student in medicine, osteopathy, dentistry, veterinary medicine, optometry, pharmacy, podiatry and public health. | Contact school financial aid office or write: U.S. Office of Education, Bureau of Student Financial Assistance, 400 Maryland Ave., S.W., Washington, D.C. 20202 |
| **Health Profession Student Loan** | Loans up to cost of tuition plus $2,500 per year for other education expenses. 7% interest rate loan deferment and federal loan repayment available. | Graduate students in medicine osteopathy, optometry, podiatry and pharmacy. | Contact school financial aid office or write: U.S. Public Health Service, Bureau of Health Manpower, Student Assistance Branch, Center Bldg., Rm. 5-41, 3700 East-West Highway, Hyattsville, Md. 20782 |
| **National Health Service Corps Scholarships (NHSC)** | All tuition fees plus $400 per month stipend. | Full-time student enrolled in professional study of medicine, osteopathy, dentistry, baccalaureate nursing, nurse practitioner, nurse midwife, public health nursing, public health nutrition. | Contact school financial aid office or write: NHSC Scholarship Program Center Bldg., Rm. 5-44, 3700 East-West Highway, Hyattsville, Md. 20782 |
| **Nursing Scholarship Program** | $2,000 per year maximum for school expenses. | Exceptional financial need. Half-time or full-time beginning, registered nursing students. | Contact school financial aid office or write: U.S. Public Health Service Bureau of Health Manpower, Student Assistance Branch, Center Bldg., Rm. 5-41, 3700 East-West Highway, Hyattsville, Md. 20782 |
| **Nursing Student Loan** | Loans up to $2,500 per year maximum; and deferment loan cancellation available. | Halftime or full-time beginning registered nursing students. | Same as above. |
| **Loan Repayment Provision for Nursing Students** | Partial (up to 85%) Federal cancellation loan repayment of all loans for registered nursing education. | Student must serve a minimum 2 years in health manpower shortage area. | Same as above. |
| **Scholarship for 1st Year Students of Exceptional Financial Need** | Full tuition reasonable education expenses, plus $400 per month stipend. | Exceptional financial need. Must be graduate student in medicine, osteopathy, dentistry, veterinary medicine, optometry, podiatry, pharmacy. | Same as above. |

## State Programs of Undergraduate Financial Aid

**Alabama**
Alabama Student Assistance Program
Room 812, State Office Building
Montgomery, Alabama 36310
(205) 832-3946

**Alaska**
Alaska Commission on Postsecondary Education
Pouch F
Juneau, Alaska 99811
(907) 465-2855

**Arizona**
Arizona Commission for Postsecondary Education
4350 East Camelback Road, Suite 140-F
Phoenix Arizona 85018
(602) 271-3109

**Arkansas**
Department of Higher Education
State Scholarship Program
1301 West 7th Street
Little Rock, Arkansas 72201
(501) 371-1441

**California**
California Student Aid Commission
1410 5th Street
Sacramento, California 95814
(916) 445-0880

**Colorado**
Colorado Commission on Higher Education
Room 1000, State Social Services Building
1575 Sherman
Denver, Colorado 80203
(303) 892-2723

**Connecticut**
Commission for Higher Education
for Connecticut State Scholarship Commission
340 Capitol Avenue
Hartford, Connecticut 60115
(203) 566-3910

**Delaware**
Department of Public Instruction
Townsend Building
Dover, Delaware 19901
(302) 678-4620

**District of Columbia**
Department of Human Resources
1329 E Street, NW
Washington, D.C. 20004
(202)347-5905

**Florida**
Department of Education
563 Knott Building
Tallahassee, Florida 32304
(904) 487-1800

**Georgia**
State Scholarship Commission
9 LaVista Perimeter Park, Suite 110
Tucker, Georgia 30084
(404) 393-7253

**Hawaii**
Board of Regents—University of Hawaii
2444 Dole Street, Bach. 205
Honolulu, Hawaii 96822
(808) 948-7487

**Idaho**
Office of the State Board of Education
613 W. State Street, Capitol Mall
Boise, Idaho 83720
(208) 384-2770

**Illinois**
Illinois State Scholarship Commission
102 Wilmot Road
Deerfield, Illinois 60015
(312) 945-1500

**Indiana**
State Scholarship Commission
514 State Office Building
100 N. Senate Avenue
Indianapolis, Indiana 46204
(317) 633-5445

**Iowa**
Iowa Higher Education Facilities Commission
201 Jewett Building
Des Moines, Iowa 50309
(515) 281-3501

**Kansas**
Board of Regents, State of Kansas
1100 Merchants National Bank Tower
Topeka, Kansas 66612
(913) 296-3517

**Kentucky**
Higher Education Assistance Authority
120 Mero Street
Frankfort, Kentucky 40601
(502) 564-7990

**Louisiana**
Louisiana Higher Education Assistance Commission
P.O. Box 44127, Capitol Station
Baton Rouge, Louisiana 70804
(504) 389-5491

**Maine**
State Department of Educational and Cultural Services
Higher Education Services
Student Aid Programs
Augusta, Maine 04330
(207) 289-2181

**Maryland**
State Scholarship Board
2100 Guilford Avenue
Baltimore, Maryland 21218
(301) 383-4097

**Massachusetts**
Massachusetts Board of Higher Education
Park Square Building—6th Floor
St. James Avenue
Boston, Massachusetts 02116
(617) 727-5366

**Michigan**
Student Financial Assistance Services
Michigan Department of Education
Box 30008
Lansing, Michigan 48909
(517) 373-3394

**Minnesota**
Minnesota Higher Education Coordinating Board
550 Cedar Street, Suite 901
Capitol Square Building
St. Paul, Minnesota 55101
(612) 296-5715

**Mississippi**
Governor's Office of Education Training
P.O. Box 4300
Jackson, Mississippi 39216
(601) 354-7523

**Missouri**
Department of Higher Education
600 Clark Avenue
Jefferson City, Missouri 65101
(314) 751-3940

**Montana**
Office of the Commissioner of Higher Education
1231—11th Avenue
Helena, Montana 59601
(406) 449-3024

**Nebraska**
Nebraska Coordinating Commission for Postsecondary Education
301 Centennial Mall, South
P.O. Box 95005
Lincoln, Nebraska 86509
(402) 471-2847

**Nevada**
University of Nevada
Financial Aid Office
Thompson Student Services Center
Reno, Nevada 89507
(702) 784-6582

**New Hampshire**
Postsecondary Education Commission
66 South Street
Concord, New Hampshire 03301
(603) 271-2555

**New Jersey**
Department of Higher Education
P.O. Box 1417
Trenton, New Jersey 08625
(609) 292-8770

**New Mexico**
Board of Educational Finance
Legislative-Executive Building
Room 201
Santa Fe, New Mexico 87503
(505) 827-2115

**New York**
New York State Higher Education Services Corporation
Tower Building, Empire State Plaza
Albany, New York 12223
(518) 474-5592

**North Carolina**
State Education Assistance Authority
University Square, West
P.O. Box 2688
Chapel Hill, North Carolina 27514
(919) 929-2136

**North Dakota**
Student Financial Assistance Agency
State Board of Higher Education
Tenth Floor, State Capitol
Bismarck, North Dakota 58505
(701) 224-2960

**Ohio**
Ohio Board of Regents
30 East Broad Street
Columbus, Ohio 43215
(614) 466-7420

**Oklahoma**
Oklahoma State Regents for Higher Education
500 Education Building, State Capitol Complex
Oklahoma City, Oklahoma 73105
(405) 521-2444, Extension 74

**Oregon**
Oregon State Scholarship Commission
1445 Willamette Street
Eugene, Oregon 97401
(503) 686-4166

**Pennsylvania**
Pennsylvania Higher Education Assistance Agency
Towne House
Harrisburg, Pennsylvania 17102
(717) 787-1937

**Rhode Island**
Department of Education
Roger Williams Building
22 Hayes Street
Providence, Rhode Island 02908
(401) 277-2050

**South Carolina**
South Carolina Tuition Grants Agency
411 Kenan Building
Columbia, South Carolina 29201
(803) 758-7070

**South Dakota**
Department of Education & Cultural Affairs
New Office Building
Pierre, South Dakota 57501
(605) 224-3134

**Tennessee**
Tennessee Student Assistance Corporation
707 Main Street
Nashville, Tennessee 37206
(615) 741-1346

**Texas**
Coordinating Board, Texas College and University System
P.O. Box 12788, Capitol Station
Austin, Texas 78711
(512) 475-4147

**Utah**
Utah System of Higher Education
University Club Building, Room 1201
136 East South Temple
Salt Lake City, Utah 84111
(801) 533-5617

**Vermont**
Vermont Student Assistance Corporation
5 Burlington Square
Vermont Federal Savings & Loan Building
Burlington, Vermont 05401
(802) 658-4530

**Virginia**
State Council of Higher Education for Virginia
911 East Broad Street, 10th Floor
Richmond, Virginia 23219
(804) 786-3051

**Washington**
Council for Postsecondary Education
908 E. Fifth
Olympia, Washington 98504
(206) 753-3571

**West Virginia**
Director of Student Services
West Virginia Higher Education Grants Program
West Virginia Board of Regents Institute
Charleston, West Virginia 25301
(304) 768-7319, Extension 258

**Wisconsin**
Higher Education Aids Board
115 West Wilson Street
Madison, Wisconsin 53702
(608) 266-2897

**Wyoming**
Wyoming Higher Education Council
State Office Building
West Cheyenne, Wyoming 82002
(307) 777-7763

**American Samoa**
Director of Education
Department of Education
Pago Pago, American Samoa 96799
(Overseas) 633-5237

**Guam**
University Board of Regents
P.O. Box EK
Agana, Guam 96910
(734)2177

**Puerto Rico**
Council on Higher Education
Box F, U.P.R. Station
Rio Piedras, Puerto Rico 00931
(809) 765-6590, Extension 266

**Trust Territory**
Trust Territory of the Pacific Islands
Student Assistance Office
Department of Education
Office of the High Commissioner
Saipan, Mariana Islands 96950
Overseas/Saipan 9870

**Virgin Islands**
Virgin Islands Department of Education
Charlotte Amalie
St. Thomas, Virgin Islands 00801
(809) 774-0100, Extension 271

## Sources of Information on the Guaranteed Student Loan Program

**Alabama**
Director, OGSL
Office of Education, Region IV
50 Seventh Street, N.E.—Room 513
Atlanta, Georgia 30323
(404) 526-3106

**Alaska**
Student Aid Office
State Education Department
Pouch F, AOB
Juneau, Alaska 99801

**Arizona**
Director, OGSL
Office of Education, Region IX
50 United Nations Plaza
San Francisco, California 94102
(415) 556-1630

**Arkansas**
Student Loan Guarantee Foundation of Arkansas
Suite 515, 1515 West 7th Street
Little Rock, Arkansas 72202
(501) 376-2931

**California (See Arizona)**

**Colorado**
Director, OGSL
Office of Education, Region VIII
Federal Office Building, Box 3608
19th and Stout Streets
Denver, Colorado 80202
(303) 837-4128

**Connecticut**
Connecticut Student Loan Foundation
251 Asylum Street
Hartford, Connecticut 06103
(203 547-1510

**Delaware**
Delaware Higher Education Loan Program
c/o Brandywine College
Post Office Box 7139
Wilmington, Delaware 19803
(302) 478-3000 Ext. 34

**District of Columbia**
D.C. Student Loan Insurance Program
1329 E Street, NW.
Washington, D.C. 20004
(202) 638-1020

**Florida (See Alabama)**

**Georgia**
Georgia Higher Education Assistance Corporation
9 La Vista Perimeter Park
2187 Northlake Parkway
Tucker, Georgia 30084
(404) 939-5004

**Hawaii (See Arizona)**

**Idaho**
Director, OGSL
Office of Education, Region X
1321 Second Avenue—M.S. 1512
Seattle, Washington 98101
(206) 399-4156

**Illinois**
Illinois Guaranteed Loan Program
102 Wilmot Road
Deerfield, Illinois 60015
(312) 945-7040

**Indiana**
Director, OGSL
Office of Education, Region V
300 South Wacker Drive
Chicago, Illinois 60606
(312) 353-4769

**Iowa**
Director, OGSL
Office of Education, Region VII
601 East 12th Street, Room 360
Kansas City, Missouri 64106
(816) 374-3789

**Kansas (See Iowa)**

**Kentucky (See Alabama)**

**Louisiana (In-State residents)**
Louisiana Higher Education Assistance Commission
Post Office Box 44095
Capitol Station
Baton Rouge, Louisiana 70804
(504) 389-5491

**Louisiana (Out-of-State residents)**
United Student Aid Funds, Inc.
200 East 42nd Street
New York, New York 10017

**Maine**
Maine State Department of Education and Cultural Services
Augusta, Maine 04330
(207) 289-2475

**Maryland**
Maryland Higher Education Loan Corporation
2100 Guilford Avenue
Baltimore, Maryland 21218
(301) 383-4150

**Massachusetts**
Massachusetts Higher Education Assistance Corporation
511 Statler Building
Boston, Massachusetts 02116
(617) 426-9434

**Michigan**
Michigan Higher Education Assistance Authority
309 North Washington Avenue
Lansing, Michigan 48902
(517) 373-0760

**Minnesota (See Indiana)**

**Mississippi (See Alabama)**

**Missouri (See Iowa)**

**Montana (See Colorado)**

**Nebraska (See Iowa)**

**Nevada**
State Department of Education
Carson City, Nevada 78901
(702) 885-5700 Ext. 270

**New Hampshire**
New Hampshire Higher Education Assistance Foundation
3 Capitol Street
Concord, New Hampshire 03301
(603) 225-6612

**New Jersey**
New Jersey Higher Education Assistance Authority
1474 Prospect Street
Post Office Box 1417
Trenton, New Jersey 08625
(609) 292-3906

**New Mexico**
Director, OGSL
Office of Education, Region VI
1200 Main Tower
Dallas, Texas 75201
(214) 665-3626

**New York**
New York Higher Education Services Corporation
Tower Bldg., Empire State Plaza
Albany, New York 12205
(518) 474-5592

**North Carolina**
North Carolina State Education Assistance Arthority
Post Office Box 2688, Chapel Hill
Chapel Hill, North Carolina 27514
(919) 933-6981

**North Dakota (See Colorado)**

**Ohio**
Ohio Student Loan Commission
33 North High Street
Columbus, Ohio 43215
(614) 466-8716

**Oklahoma**
Oklahoma State Regents for Higher Education
500 Education Building
State Capitol Complex
Oklahoma City, Oklahoma 73105
(405) 521-2444

**Oregon**
State of Oregon Scholarship Commission
1445 Willamette Street
Eugene, Oregon 97401
(503) 686-4166

**Pennsylvania**
Pennsylvania Higher Education Assistance Agency
Towne House, 660 Boas Street
Harrisburg, Pennsylvania 17102
(717) 787-1932

**Puerto Rico**
Director, OGSL
Office of Education, Region II
26 Federal Plaza—Room 406
New York, New York 10022
(212) 264-8746

**Rhode Island**
Rhode Island Higher Education Assistance Corporation
Room 414, 187 Westminster Mall
Post Office Box 579
Providence, Rhode Island 02901
(401) 421-4964 Ext. 1834

**South Carolina (See Louisiana Out-of-State residents)**

**South Dakota (See Colorado)**

**Tennessee**
Tennessee Education Loan Corporation
Cordell Hull Bldg., FL. C-3, Room 301
Nashville, Tennessee 37219
(615) 741-1346

**Texas (See New Mexico)**

**Utah (See Colorado)**

**Vermont**
Vermont Student Assistance Corporation
156 College Street
Burlington, Vermont 05401
(802) 658-4530

**Virginia**
Virginia State Education Assistance Authority
501 East Franklin Street
Suite 311, Professional Building
Richmond, Virginia 23219
(804) 786-2035

**Washington (See Idaho)**

**West Virginia**
Director, OGSL
Office of Education, Region III
Post Office Box 13716
3535 Market Street
Philadelphia, Pennsylvania 19101
(215) 596-1031

**Wisconsin**
Wisconsin Higher Education Corporation
State Office Building
115 West Wilson Street
Madison, Wisconsin 53702
(608) 266-0887

**Wyoming (See Colorado)**

**American Samoa (See Arizona)**

**Guam (See Arizona)**

**Trust Territory (See Arizona)**

**Virgin Islands (See Louisiana Out-of-State residents)**

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